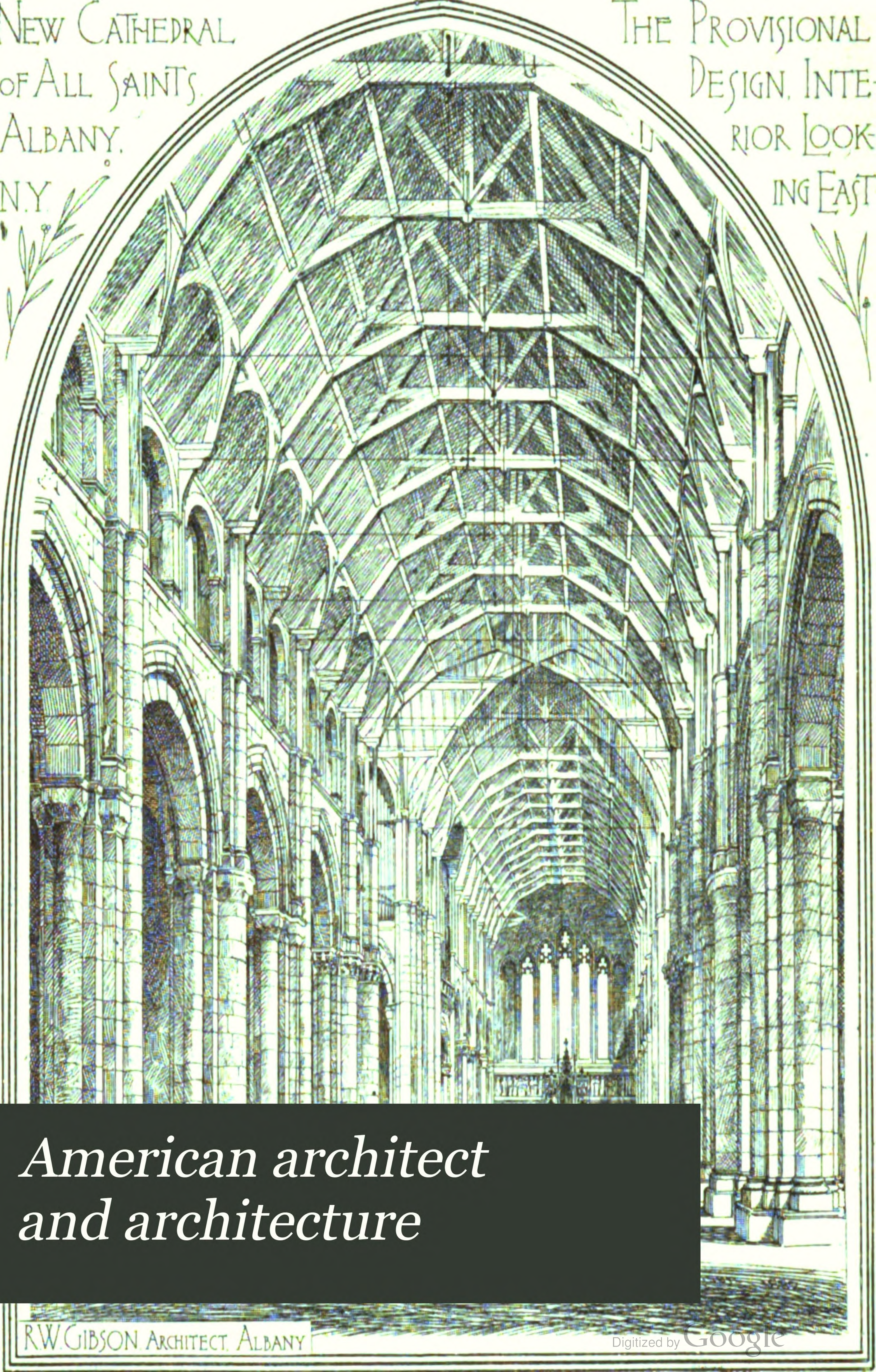

American architect and architecture

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BUILDING NEWS

J. H. Price

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JULY – DECEMBER
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The American Architect and Building News

INDEX TO VOLUME XIV.

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ILLUSTRATIONS.

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ing to tenants. Such a programme offers a very attractive field for ingenuity in planning, and without taxing too much the time of competitors it is capable of suggesting a beautiful and refined elevation. The committee observes that the apartments for the use of the Institute ought to comprise a lecture-hall, which would serve for meetings and exhibitions, besides a parlor, library, and reading-room; but the arrangement of the rest of the building is left to the judgment of each competitor. We may, perhaps, be allowed to add to these instructions the suggestion that the competition, undertaken merely as a pleasant exercise for the members of the Institute, may, with this programme, have a future practical application. It is well known that the Institute of Architects is already in possession of the nucleus of a building fund, and under the present laws of New York, relating to joint ownership in apartment-houses, and other buildings, a score or so of the members practising in the city might make a much worse investment of a small capital than to co-operate with the Institute in the erection of a structure which would accommodate them with office-rooms, planned expressly for their business, and at a rent which would probably be much less than that which they now pay; or, if they should at any time prefer other quarters, would constitute a very saleable property, as well as one which would constantly increase in value.

IT would be interesting, perhaps, to know why trials in the District of Columbia should be distinguished above all others by their tedious length, and the bad manners of the counsel employed to conduct them, but such an inquiry is beyond our province, and we are obliged, in our study of the investigation now going on at Washington in respect to the administration of the work upon public buildings, to sift out what we can of real interest from a mass of testimony which appears to the professional mind to be completely irrelevant. One of the most curious features of the case which we have so far been able to discover is to be observed in relation to certain contracts for tiling, which were awarded to a firm in Baltimore, and were followed by very large bills for extra work performed by the same firm. At the first view, the circumstance that a contract for tiling had been followed by an extra bill amounting to something like fifty thousand dollars would seem to cast a reflection on the prudence of the person who made the

increase in the risk from fire which excessive height involves, the new scale of rates, although it will be rather startling to the owners of lofty buildings, cannot be called unreasonable, and its general adoption would tend very greatly, by rendering such buildings unpopular among tenants, and unprofitable to their owners, to put an end to their construction unless built, as they ought to be, fire-proof; while the whole community would in the end gain much more than the underwriters by the suppression of a practice which is every day becoming more dangerous to all our cities.

THAT singular body of censors known as the Philadelphia Committee of One Hundred, has, according to the daily papers, been directing some of its steps toward dangerous ground. With that zeal in calling attention to the faults of others which marks good citizens everywhere, some virtuous individual addressed to the Committee a communication, charging that frauds were being perpetrated in the erection of the public school-houses, and the agent of the Committee was deputed to ascertain the truth. What might have been the agent's qualifications for judging of the facts which he was sent to investigate, we are not informed; but it seems that he was at least prudent enough to take with him a copy of the specifications to compare with the executed work. The specifications were, according to the account, not without peculiarities of their own, for they are reported to have provided that the mortar in the walls below ground should be made with cement and "gravel," instead of the usual sand; but the actual construction of the building was still more exceptionable, "loam from the cellar," according to the agent's report, having been used instead of the materials required. We will not pause to inquire whether it is usual in Philadelphia to dig loam out of the bottom of cellars, as it seems that the contractor, being confronted with his work, "very reluctantly admitted that he had in every sense violated the terms of his agreement with the Board." The agent, apparently charmed with this concession, pronounced the work in general to be "of the most inferior character," although we find no details of its inferiority given, except that the bond-stones in the piers were two inches thick, instead of five inches, as the specifications required. Probably we should read two and one-half, instead of two inches, as the real thickness, and it is not impossible that by the substi-

tution of a better stone, the bond-plates one brick thick may have been as good or better than those specified, but the Committee on Property, which seems to have charge of such affairs, examined the building, and ordered the whole work to be taken down to the footings, and rebuilt. It is quite likely that in the present case the Committee is right in this summary proceeding; but we may be excused for hinting that we have known crafty contractors to invite, or at least not to oppose, the hasty action of over-zealous proprietors, misled by silly reports, and afterwards to recover a good, round price, with costs, if not damages besides, for being compelled to pull down and rebuild work, which the more sober judgment of an expert proved to have been executed in a manner within the intention of the contract.

THE Cleveland Building Law, about which we had something to say a few weeks ago, has been under discussion among the mechanics of that city, and some valuable suggestions have been made. For the first time, we believe, it has been pointed out in the discussion of a building statute, that the necessary thickness of walls of masonry does not depend upon the number of floors which rest upon them, but on the height, and, we might add, on their length; the thickness beyond a comparatively small limit, being an affair of stability, not of resistance to crushing, and an increase in the number of floors within a given height adding to, rather than diminishing from, the stability of the bearing walls. The omission in the original law to give permission for the construction of iron fronts for mercantile buildings seems to have immediately attracted the attention of the members of the Builders' Exchange, and an amended section is proposed, providing for the use of iron, subject to the approval of a Board of Examiners. Concerning the thickness of walls of chimney flues, which is always a point of difficulty in construction, the committee of the Exchange proposes that a variation should be made from the text of the law as adopted, authorizing the building of flues with four-inch walls, lined with pipes of terra-cotta or fire-clay. This modification in the ordinance would relieve conscientious builders of many annoyances in framing, and, particularly if the terra-cotta pipe is so shaped as to leave a small air-space between it and the brickwork, a perfectly safe construction can be so obtained. As we have before remarked, the perfect building law has yet to be drawn up, and all criticisms of existing ones from men of experience are valuable.

A SCULPTOR of local note has just died in Philadelphia, whose history is a somewhat romantic one. Born in Paris in 1825, he had just arrived at the most ardent and inflammable age, when the revolution of 1848 broke out, and was among the first to take part in the movement which drove the last king from France. His active interest in the revolt made, however, his native country an uncomfortable place of residence for him, and he came to Philadelphia, where, under the name of Joseph A. Bailly, he soon found employment and reputation as a cameo-cutter, and afterwards as a modeller and sculptor. Among the public works which he executed are the statue of Washington, in Philadelphia, that of Franklin, on the corner of the *Public Ledger* building, and of Dr. Witherspoon in Fairmount Park; besides some monuments in Laurel Hill Cemetery, and other places.

WE are indebted to the kindness of a correspondent for some interesting information in regard to the competition for the new State Capitol to be built at Denver, Colorado. Some of our readers will remember that in March of this year advertisements were published calling upon architects for competitive designs for a building to cost not more than a million dollars. Nothing was said about the scale of the drawings to be presented, nor about any premium for the best design; but it was stipulated that the person whose plans should be accepted should furnish plans and specifications of the entire building, with working drawings for the single wing, which it is proposed to erect immediately, receiving as compensation for his trouble the sum of one thousand dollars, besides one and one-half per cent on the contract price of this wing. It was supposed that the wing could be built for about two hundred thousand dollars, so that the dazzling prize held forth to the struggling competitors was the remote possibility of obtaining for their skill and pains the chance of being employed for two years or more in a most engrossing and anxious work for less than one-tenth the compensation which is paid to respectable architects for similar services in all other parts of the world.

STRANGE as it may seem, this invitation attracted the attention of no less than nine cheap architects, or, at least, of nine persons who had some idea of drawing, and the result of their several efforts was duly submitted to the Commissioners. The inspection of the plans laid before them seems at least to have had the good effect of opening the eyes of the Commissioners in some degree to the magnitude of the cares and responsibilities involved in the construction of a large public building, and to have led them to suspect, what five minutes' consultation with a respectable architect would have shown them in the first place, that the programme which had been drawn up for the guidance of the competitors was, to use their own words, in some respects "impossible," and in others "foolish." It was not so ludicrously silly as one which we once saw, for a much more costly building, in which the area of the second story, as found by adding together the number of square feet allotted to the various rooms in it, was about twice as great as that of the story beneath it; but it contained stipulations as to the cost and the time of completion of the preliminary wing which could not under any circumstances be complied with, and provisions in regard to the arrangement and construction which would seriously compromise the usefulness, if not the stability of the whole structure. One would think that the Commissioners, having discovered so late the grave errors in the statute which a little preliminary outlay for expert advice might have prevented, would have called in at once the assistance of some one trained in the understanding of such matters; but being men, apparently, who prefer the costly mode of learning by experience to that of consultation with professional advisers, they proceeded instead to set off by themselves for a tour among the State Capitols of the surrounding country, travelling as far eastward as Indianapolis, and securing, as we learn, "a vast amount of valuable information." The principal result of their experience was a conviction that the statute (drawn up by a judge) under which their Capitol was to be erected, needed radical and immediate revision; and as no authority could revise the law except the one which enacted it, the Board prepared and presented to the Governor a formal request that he would call an extra session of the Legislature to undo what it had done a few months before. The answer to the application had not been received at the time of our correspondent's latest advices, but it was expected to be favorable; the Commissioners arguing, very forcibly, that an extra session would only cost the State about seventy-five hundred dollars, while the saving involved in the changes which they proposed in the plans would amount to more than a hundred thousand. We might add, that to the outside world the fact appears pretty evident, that the seventy-five hundred dollars, with the cost of the peregrinations of the Board, might also have been saved by taking expert advice where others take it, — at the beginning; and moreover, that before the State gets through with building its million-dollar Capitol from the plans of an architect who works for one-tenth the usual price it is likely to find out again, and on a larger scale, that amateur or cheap professional service is the most costly of all luxuries.

OWING apparently to some changes in the organization of the corporation which owns it, work on the Hudson River Tunnel has been for some time nearly suspended, and the pioneer tunnel on the New York side of the river has hardly yet reached the silt, in which, after all the difficulties encountered on the way, it was expected that it would make rapid progress toward completion. During the delay, however, the engineers of the tunnel have taken care to maintain a sufficient air-pressure in the excavation to prevent earth from entering the headings, and a slight leakage of air which took place under one of the steamship docks, was promptly discovered and stopped, so that everything is in readiness for the prompt resumption of active operations, which may, it is hoped, occur in a few days. The first work to be undertaken in that case will be the commencement of the second tunnel on the New York side, which will, like the first, be carried out to the silt, then all the four headings, two on the New York side and two on the New Jersey side, will be carried forward simultaneously, until they meet in the middle of the river.

BUILDING SUPERINTENDENCE.—XXXI.

CONCLUSION.

IT will be seen that this plan of ventilation is totally different from that which would be adopted in a school-room, or other apartment with a low, flat ceiling. In such a room the best method would generally be to employ indirect radiation entirely, warming the fresh air in the basement, and bringing it up through long vertical pipes opening into the room by registers in the side walls, seven or eight feet above the floor, withdrawing the cold and foul air below, by exhaust registers in or near the floor. By this arrangement the fresh, warm air would pass first to the ceiling, filling the room like an inverted lake, and constantly pressing out the foul strata below, without danger of annoying the occupants of the rooms by draughts.

School-room Ventilation.

In the present case, however, we are precluded from employing any method of this kind by the great height of the ceiling, and the extent of cooling surface presented by the roof. The warm air introduced at any considerable height above the floor would rise immediately to the ridge, cooling there with great rapidity, to be precipitated again in cold draughts upon the heads of the people below, who would remain immersed in a chilly atmosphere even though that above them might be warmed to a temperature of 100° or more. It would be impracticable to fill so great a space, losing heat, moreover, so rapidly as would be inevitable under the circumstances, with anything approaching the inverted atmospheric lake of a low room, and our only resource here is therefore to keep the fresh-air supply near the floor, avoiding unpleasant draughts as much as possible, but directing all the warm currents so that they may reach those who are to breathe them before they can escape from the slight attraction exerted upon them by the floor and the objects near it, and rise into the empty space above, to be lost beyond recovery.

The course of circulation of the air being once determined, many circumstances can be made use of to promote it, and all obstacles should be removed. Radiators ought not to be placed in such a position that the inevitable ascending current from them will interfere with the general movement, and even the aspect of the different portions of the room will need to be considered, the northern and western sides being generally coldest in winter, and chilling the air next to them so as to cause it to descend, while that on the opposite side rises, in a movement of gentle rotation, which can be checked, if it should interfere with the desired system of circulation, by increasing the radiating surface near the cold walls.

Summer Ventilation.

Such ventilation as this is of course dependent upon the difference in temperature between the exterior and interior air, and the movements due to the buoyancy of warm-currents in a cold atmosphere will cease entirely as soon as the temperature outside and inside become the same. For summer ventilation, therefore, we shall need to devise a modified system, which can at pleasure be substituted for the other, but will not interfere with it at other times. Fortunately, summer is also the time of open windows, and the warm-weather ventilation is, in such a case as this, a much simpler affair than that needed for winter. The occupants of the offices in the basement and first story will keep their windows generally as wide open as possible in the hot months, and if we remember to provide fan-lights over the doors, and to place the doors opening on the corridor nearly opposite each other, we can secure for them an almost constant draught across the width of the building, which will keep the rooms as fresh as could be desired. The corridor itself, if much frequented, may need, even in summer, to be exhausted by means of its special flue, which must in that case be kept heated by a large gas-burner, in order to preserve that difference in temperature between the air inside the flue and the outside atmosphere on which the movement of the former entirely depends.

For the great hall in the second story we shall need something more than open windows, not for the sake of a fresh-air supply, since these large openings, placed opposite each other in so long a building, isolated from all others, would give a breeze across the room in the hottest night, but to remove the air which would, unless allowed to escape, collect under the roof, filling the space down to the heads of the windows with a stagnant mass, often very much heated by contact with the underside of the slated roof, upon which the sun shines all day, and always containing most of the organic impurities thrown off by the lungs and skins of the people below, which rise with their warm breath even in the atmosphere of summer. This reservoir of foul and heated vapor, although confined to the space above the sweep of the fresh breeze from the windows, is apt to make its presence disagreeably felt by diffusion through the purer atmosphere far below it, and it is important to provide for tapping it, so to speak, and allowing its contents to flow, in accordance with their natural buoyancy, upward from the highest point of the roof into the outer air. It would be useless to try to draw the foul, warm air downward as far as the openings into the tower ventilating-shaft, since its buoyant force, after a day of summer sunshine, is far too great to be counteracted by any exhaust which could be obtained in the ventilating-shaft without the aid of a fan; and it is very desirable to take full advantage of the acquired tendency of the stratum of air which we wish to remove, to assist its discharge. For this purpose an open turret on the ridge answers perhaps better than anything else. The length of the warm current ascending through it assists its velocity, and helps to draw up that which would tend to linger behind; and its position at the summit of the roof ensures the removal of the last traces of the warm and foul stratum. So long as any persons remain in the hall, or gas-lights continue to burn there, new volumes of deteriorated air will ascend to take the place of that discharged from the ridge, but if not allowed to stagnate, or accumulate heat from the roof, they will not affect the atmosphere below.

Details of Heating Apparatus.

Having now evolved a satisfactory general scheme of heating and ventilation, the details only will need attention, and these will not, for our present purpose, detain us long. After the contract for the heating apparatus has been made, and the contractor has made his appearance, with his materials, upon the ground, we shall need to examine, and if necessary to criticise, the construction of the boiler, the dimensions of the pipes, and the arrangements of them and of the radiators.

Many good heating engineers employ boilers and radiators of their own construction, to which the arrangement of the pipes must be suited; but there are some general principles applicable to all systems. The essential features of a good steam-heating apparatus are: safety from all risk of explosion, sufficient and well-placed radiating surfaces, freedom from noise in operation, and thorough drainage of all parts, so that the pipes and radiators may not be subject to injury from water left standing in them, and freezing. The first of these requisites is satisfied in various ways.

Sectional Boilers.

Many engineers, instead of boilers with a single shell, use for heating the so-called "sectional boilers," consisting of coils or groups of pipes, sometimes of wrought-iron, but generally cast, joined together in sets of five or six or even more, over a single fire-box. The water and steam circulate freely among the sections, but in case of over-heating, or insufficient water-supply, not more than one section is likely to give way at once, and the explosion of a single section, even in the basement of a dwelling-house, is rarely a serious matter. Cast-iron boilers of this kind are rather liable to such accidents, but the escape of water from the broken part extinguishes the fire, and a new section is quickly put in place of the one destroyed, making the boiler as good as ever.

Magazine Boilers.

For convenience in use, it is becoming common to adopt what are known as "magazine boilers," in which the fire-box is fed in the same way as a base-burning stove, by coal descending gradually from a cylindrical or conical magazine above. Unlike a hot-air furnace, which distributes some warmth through the registers until the last spark of fire has gone out, and the ashes have grown cold, a steam-heating apparatus, as soon as the water in it ceases to boil, and the steam-pressure falls, loses all its power of transmitting warmth to a distance, and the rooms dependent upon it rapidly cool. With ordinary house boilers, while it is easy enough to bank up the fire and keep it over night, ready to shake out and brighten up the next morning, it is difficult to maintain it without attention for six or seven hours in a state of sufficiently active combustion to keep steam in the radiators, and houses fitted in this way are apt to be cold during the night, but the self-feeding boilers, in which coal enough can be put at once into the magazine to supply a brisk fire without attention for ten or twelve hours, meet this difficulty with perfect success.

Tubular Boilers.

For large buildings, in which economy must be studied in the consumption of coal, and where skilled firemen or engineers are always near at hand to attend to it, the ordinary return-flue tubular boiler usually gives the best results, although there are various modifications of this, made with vertical tubes, which offer advantages in point of quick response to the urging of the fire, and comparative freedom from liability to choke up if neglected. That all such boilers are more or less liable to explosion cannot be denied, but the danger may be reduced to a minimum by insisting rigidly upon a hydrostatic test, and if possible a steam test, of at least 150 pounds to the square inch, even for a low-pressure boiler, before it is allowed to be put into the building. After this, care, clear water, which will not deposit sediment, and frequent cleaning, will insure comparative safety.

Pipe System.

As affecting the general efficiency of the heating-apparatus, the character of the boiler is of even less importance than that of the system of pipes and radiators by which the steam from it is distributed, condensed, so as to give up its latent heat in sensible form, and returned in the shape of water to the boiler from which it started. In order to be quiet and effective, the circulation must be continuous, the steam always flowing in one direction from the top of the boiler, and the water returning into the bottom, without any of that meeting of the two currents which is

Noise in Pipes.

indicated by the cracking and snapping of badly-planned apparatus. The necessary elements of every pipe system including radiators are the steam-distributing pipes, which carry the steam to the radiators, and the return-pipes, which bring back the condensed water to the boiler. These two duties cannot be fulfilled by a single pipe, except in apparatus on the smallest scale, without loss of heating power, and annoyance from the constant noisy collisions of the steam and water in the pipes, shaking them through their whole length by the violence with which the water is driven hither and thither in them. Such a method of heating, therefore, although cheap in first cost, is never employed in good work for buildings of any considerable size. For these, separate returns are, or should be, always used, and the effectiveness with which these do their work is nearly proportional to their extent, and consequent cost. In the simplest circulating arrangement, two pipes run side by side upward through the building near each line of radiators, one of which is connected with the steam dome of the boiler, and the other with the water at the bottom. From the former pipe branches are taken off to the steam-valve of each radiator, and branches from the corresponding return-valves connect with the other.

Relief-Pipes.

Separate Return-Risers.

Trapping Returns.

If the process of condensation took place only in the radiators, this arrangement would not need to be further complicated, but where the steam-distributing pipes are long, some condensation, with low-pressure apparatus, takes place in them, partially filling the horizontal portions with water, causing irregular action and noise. To prevent this, all horizontal distributing-pipes are in good work laid with an inclination downward, in a direction away from the boiler, so that the force of gravitation and the pressure of the current of steam will co-operate in carrying any condensed water which may form or collect in them to the lowest point, from which it runs out through a vertical "relief-pipe," which is carried down to the main return-pipe below, entering beneath the water-line. If this is done, as it should be for all horizontal pipes of any considerable length, or so placed as to receive the condensed water from a long vertical distributing-pipe above, there will be little danger of noise in the supply-pipes. The return-pipes may, however, still give trouble, as the steam may blow rapidly through some radiators into the returns, at the same time that streams of water are descending from radiators situated on the same line in colder rooms above, causing collisions and noise. To meet this danger, the proper way is to furnish each radiator with its own return-pipe, carried down separately and entered into the main return in the basement, below the water-line. Then, since the foot of the pipe is thus trapped, no steam can enter any return-pipe except through its own radiator, and the flow, both of steam and water through it, will thus be always in the same direction, and collisions will be impossible. Such separate returns for each radiator consume, however, much pipe and money, and the usual mode of palliating the inconveniences arising from the connection of several radiators with a single vertical return is simply to enlarge the pipe so as to give as much room as possible for the steam and water to pass by each other. Which of these methods should be adopted must depend upon circumstances, a favorable arrangement of radiators making it possible to use in one instance a system of piping which would give much trouble in another. In general, the radiators should be so distributed that no vertical pipe, either for steam or return, shall serve more than two radiators on each floor, and even then it is best to make the connections with the two radiators at different levels, to prevent one radiator from drawing air or water, as well as steam, from the other.

Size of Pipes.

The rule for the size of main steam-distributing-pipes is that they should have three-fourths of a square inch of sectional area for each one hundred square feet of radiating surface which they supply; the size being slightly diminished toward the end of the pipe. Return-pipes are usually made one size smaller than the steam supply-pipes, and it must be carefully borne in mind that all the pipes, both for steam and return, will expand and contract regularly about two inches in every hundred feet, and that this expansion must be taken up in some way, or it will keep the joints strained and leaking, if it does not tear them asunder.

Expansion.

The general principle of providing for expansion is to form angles at intervals in the pipe, making each leg of the angle long enough to serve as a spring, which can move to and fro in accordance with the expansion and contraction of the other leg, without undue strain upon the joints of either. As an illustration of this principle, the vertical steam and return risers, which are usually the longest straight pipes in any building, are fixed only at the bottom, leaving the whole of the pipe above free to rise and fall as its temperature changes. The only branches from the risers are, or should be, the steam and water connections with the radiators, and to accommodate these to the movement of the risers, the radiators are always set back several feet from the main vertical pipes, communicating with them by horizontal branches, which, although fixed at one end to the radiator, are long enough to spring freely, and allow the end connected with the risers to move up and down without causing the joints to leak. If the risers are fixed at the bottom, the change in length due to expansion accumulates toward the upper end, and the radiators in the topmost stories of the building may need inconveniently long horizontal connections to take up the movement without danger of leakage. In this case it is possible, with care in arranging the lower connections with the mains, to divide the expansion by fixing the risers only at the middle instead of one end. Then the upper and lower radiators will need equally long connections, and the shortest will be those for the radiators in the middle stories. Similar arrangements for throwing the expansion where it can be best taken up may be used in setting other pipes, but such details ought to be made the subject of special study.

FLITCH-PLATE, RIVETED AND TRUSSED GIRDERS.—II.

RIVETED IRON PLATE GIRDERS.

WHENEVER the load upon a girder, or the span, is too great to admit of using an iron beam, and the use of a trussed wooden girder is impracticable, we must employ a riveted iron plate girder. Girders of this kind are quite commonly used at the present day, as they can easily be made of any strength and adapted to any span. They are not generally used for a greater span than 60 feet in buildings. These girders are generally made either like Figure 6 or Figure 7, with vertical stiffeners riveted to the web-plates. The vertical plates called web-plates, are made of a single plate of wrought-iron rarely less than ¼" or more than ⅝" thick,—generally ⅜" thick. Under a distributed load, the web if ⅜" thick is generally sufficiently strong to resist the shearing stress in the girder without buckling, provided that two vertical pieces of angle-iron are riveted to the web, near each end of the girder. These vertical pieces of angle-iron, or *T*-iron, whichever is used, are called stiffeners, and when the girder is loaded at the centre, and sometimes when under a distributed load it is necessary to use the stiffeners for the whole length of the girder, placing them apart a distance equal to the height of the girder. The web is only assumed to resist the shearing stress of the girder.

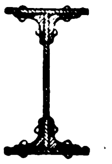


Fig. 6.

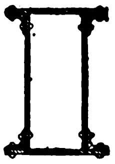


Fig. 7.

The top and bottom plates of the girder, which have to be proportioned to the loads, span, and height, are fastened to the web, by means of angle-irons. It has been found that in nearly all cases the best proportion for the angle-irons is 3" x 3" x ½", which gives the sectional area of two angles 5½ square inches. The two angles and the plate taken together form the flange, the upper ones being called the upper flange, and the lower ones the lower flange.

Rivets.—The rivets with which the plates and angle-irons are joined together should be ¾" in diameter, unless the girder is light, when ⅝" may be sufficient. The spacing ought not to exceed 6" and should be closer for heavy flanges, and in all cases it should be not more than 3" at the ends for a distance of 18 inches or 2 feet from the end. Rivets should also not be spaced closer than 2½ times their diameter.

Rules for the Strength of Riveted Girders.

In calculating the strength of a riveted girder, it is customary to consider that the flanges resist the transverse strain in the girder, and that the web resists the shearing strain. To calculate the strength of a riveted girder very accurately, we should allow for the rivet-holes in the flanges and angle-irons, but we can compute the strength of the girder with sufficient accuracy by taking the strength of the iron at only 10000 pounds per square inch, instead of 12000, which is used for rolled beams, and disregarding the rivet-holes. Proceeding on this consideration we have the following rule for the strength of the girder.

$$\text{Safe load in tons.} = \frac{10 \times \text{Area of one Flange} \times \text{Height}}{3 \times \text{Span in feet}}. \qquad (26.)$$

$$\left.\begin{array}{c}\text{Area of one flange in}\\ \text{square inches}\end{array}\right\} = \frac{3 \times \text{Load} \times \text{Span in feet}}{10 \times \text{Height of web in inches}} \qquad (27.)$$

The height of the girder is measured in inches, and is the height of the web-plate, or the distance *between* the flange-plates. *The web* we may make either ½" or ⅜" thick, and if the girder is loaded with a concentrated load at the centre or any other point, we should use vertical stiffeners, the whole length of the girder, spaced the height of the girder apart. If the load is distributed, divide one-fourth of the whole load on the girder in tons by the vertical sectional area of the web-plate, and if the quotient thus obtained exceeds the figure given in the following table, under the number nearest that which would be obtained by the following expression: $\frac{1.4 \times \text{Height of girder}}{\text{Thickness of web}}$, then stiffening pieces will be required up to within one-eighth of the span from the middle of the girder.

$\frac{d \times 1.4}{t}$	30	35	40	45	50	55	60	65	70	75	80	85	90	95
	3.08	2.84	2.61	2.39	2.18	1.99	1.82	1.66	1.52	1.40	1.28	1.17	1.08	1.00

Example.—A brick wall 20 feet in length and weighing 40 tons is to be supported by a riveted plate girder with one web. The girder will be 24" high. What should be the area of each flange, and the thickness of the web?

Ans. Area of one flange $= \frac{3 \times 40 \times 20}{10 \times 24} = 10$ square inches.

Subtracting 5 square inches for the area of two 3" x 3" angle-irons, we have 5 square inches as the area of the plate. If we make the

plate 8 inches wide, then it should be 5 ÷ 8 or five-eighths of an inch thick. The web we will make $\frac{3}{8}''$ thick, and put two stiffeners at each end of the girder. To find if it will be necessary to use more stiffeners we divide $\frac{1}{4}$ of 40 tons, equal to 10 tons, by the area of the vertical section of the web, which $= \frac{3}{8}'' \times 24'' = 9$ square inches, and we obtain 1.11.

The expression, $\frac{1.4 \times \text{Height of girder}}{\text{Thickness of web}}$, in this case, $= 89.6$ and the number nearest this in the table is 90, and the figure under it is 1.08 which is a little less than 1.11, showing that we must use vertical stiffeners up to within 3 feet of the centre of the girder, or else use a one-half-inch web-plate. The vertical stiffeners we will make of $2\frac{1}{2}''$ x $2\frac{1}{2}''$ angle-irons.

From the formula for the area of flanges the following table has been computed, which greatly facilitates the process of finding the necessary area of flanges for any given girder.

TABLE.

Coefficient of Flanges for Riveted Girders.

Coefficient for determining the area required in flanges allowing 10000 pounds per square inch of gross-section fibre strain. Multiply the load in tons of 2000 pounds uniformly distributed, by the coefficient, and divide by 1000; the quotient will be the gross area, in square inches, required for each flange.

Distance between supports in feet.	Depth of girder, out to out of web, in inches.												
	12	14	16	18	20	22	24	26	28	30	32	34	36
10	250	214	188	167	150	136	125	115	107	100	94	88	83
11	275	236	206	183	165	150	138	127	118	110	103	97	92
12	300	257	225	200	180	164	150	138	129	120	113	106	100
13	325	279	244	217	195	177	163	150	139	130	122	115	108
14	350	300	263	233	210	191	175	162	150	140	131	124	117
15	375	321	281	250	225	205	188	173	161	150	141	132	125
16	400	343	300	267	240	218	200	185	171	160	150	141	133
17	425	364	319	283	255	232	213	196	182	170	159	150	142
18	450	386	338	300	270	245	225	208	193	180	169	159	150
19	475	407	356	317	285	259	238	219	204	190	178	168	158
20	500	429	375	333	300	273	250	231	214	200	188	176	167
21	525	450	394	350	315	286	263	242	225	210	197	185	175
22	550	471	413	367	330	300	275	254	236	220	206	194	183
23	575	493	431	383	345	314	288	265	246	230	216	203	192
24	600	514	450	400	360	327	300	277	257	240	225	212	200
25	625	536	469	417	375	341	313	288	268	250	234	221	208
26	650	557	488	433	390	355	325	300	279	260	244	229	217
27	675	579	506	450	405	368	338	312	289	270	253	238	225
28	700	600	525	467	429	382	350	323	300	280	263	247	233
29	725	621	544	483	435	395	363	335	311	290	272	256	242
30	750	643	563	500	450	409	375	346	321	300	281	265	250
31	775	664	581	517	465	423	388	358	332	310	291	274	258
32	800	686	600	533	480	436	400	369	343	320	300	282	267
33	825	707	619	550	495	450	413	381	354	330	309	291	275
34	850	729	638	567	510	464	425	392	364	340	319	300	283
35	875	750	656	583	525	477	438	404	375	350	328	309	292
36	900	771	675	600	540	491	450	415	386	360	338	318	300
37	925	793	694	617	555	505	463	427	396	370	347	326	308
38	950	814	713	633	570	518	475	438	407	380	356	335	317
39	975	836	731	650	585	532	488	455	418	390	366	344	325

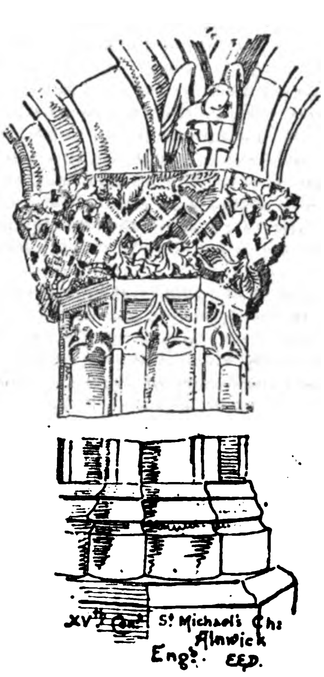
Example. — Let us take the same girder that we have just computed. Here the span was 20 feet and the depth of girder 24 inches. From the table we find the coefficient to be 250, and multiplying this by the load, 40 tons, and dividing by 1000 we have 10 square inches as the area of one flange, being the same result as that obtained before. Girders intended to carry plastering, should be limited in depth, out to out, to one-twenty-fourth of the span length, or $\frac{1}{2}''$ per foot of span, otherwise the deflection is liable to cause the plastering to crack. In heavy girders, a saving of iron may often be made by reducing the thickness of the flanges towards the ends of the girder, where the strain is less. The bending moment at a number of points in the length of the girder may be determined; and the area of the flange at the different points made proportional to the bending moments at those points. The thickness of the flanges is easily varied as required by forming them of a sufficient number of plates to give the greatest thickness, and allowing them to extend on each side of the centre only to such distances as may be necessary to give the required thickness at each point. The deflection of girders so formed will be greater than those of uniform cross-section throughout.

F. E. KIDDER.

FELT HOUSES. — An officer in the German cavalry has invented a form of transportable dwelling, which he considers will do much to obviate the inconveniences of bivouacs and the dangers to health often resulting from them. These houses are made of felt, impregnated with substances which render them impervious to water. The idea is intended to apply specially to hospital tents and the larger kinds of such dwellings. In addition to being water-tight, these tents are cool in hot weather, and, to some extent, are able to moderate a severely cold temperature. They can be packed into a few comparatively small boxes, and ventilation is duly provided for. They resist hurricanes better than linen tents. Their erection and removal is very simple, and their cost is said to be small in comparison with that of linen tents. They have been permanently introduced into the Danish army. The *Vossische Zeitung* says that leading medical authorities have approved of them.

BUILDERS' SCAFFOLDING. — XII.

THE MECHANICS OF SCAFFOLDING. — I.



MECHANICS is the science of rest, motion and force, the laws of which are the same for all bodies, celestial, terrestrial, natural and artificial, but the methods of applying the principles of mechanics to particular classes of cases vary according to circumstances peculiar to each, and hence arise branches in the general science of mechanics. It is the intention to introduce the principles of mechanics included in the branch called statics, as they are practically applicable to the solution of problems involving the forces and strains usual in scaffolding structures; and also, as far as the same conditions of the application of the fundamental principles are common to structural design, and as this paper is intended to reach working *mechanics*, who are usually the persons entrusted with the erection of scaffolding, or the superintendence of scaffold building, we will endeavor to so adapt it that they will not be deterred from reading the lessons which we shall herein consider.

2. As certain scientific terms are usually employed with restricted meanings, it will prevent confusion if at the outset we define their precise signification, because, if distinctly apprehended, it will fix the mind in a certain mode of thought which will the better prepare it for a clear conception of the line of reasoning, and a ready understanding of the principles in which they are to be employed in what we shall have occasion to enunciate.

3. It is recommended that the student shall be able to use decimal arithmetic, and understand the meaning and use of the mathematical signs, the powers of numbers, and of numerical quantities. He ought also to familiarize himself with the consideration of quantities[1] in their technical signification as represented by weights and measures of any denominations which it will be necessary to employ to represent force, stress, strain, and other statical conditions to which materials are subject in structures, either geometrically or by letters of the alphabet, or customary symbols. It would be well, too, if he learned the use of drawing-instruments, to lay off angles and simple geometrical figures, and quantities drawn to the regular draughting scales; and, above all, let the working mechanic understand that, although he is not already familiar with any of these requirements, a very little attention, if persisted in every evening, will soon enable him to understand them sufficiently for the purposes here contemplated. He must not be deterred by the appearance of a mathematical formula, which is merely a concise expression of written rules. There is no necessity, except for the mental training, and accomplishment, and the extensive body of mathematical facts which it furnishes, for a prolonged dry academic course of algebra, trigonometry, geometry, etc., as we hope to collect the elementary matter with the needful explanations so as to render it unnecessary to resort generally to special or expensive text-books on mechanics.

4. Too many writers write for mechanics in the academic text-book style, more suited to the oral recitation purposes of a regular student aided by skilled supervision, but it is wholly unsuited to those who are without these advantages, depending on their own effort, besides being hampered with an amount of stock in trade, as it were, *i. e.*, settled practical experience, gained through their own individual observation, circumscribed by the intuition afforded by their stereotyped routine of daily occupation, some of it no doubt being, in many instances, of doubtful utility, and mixed with false or irrelevant data, delusive methods of thought and conclusions, indistinct or confused formulation of ideas, with hardly the capability, and, perhaps, none of the adaptability of receiving instruction in the methods common to young men of academic habits. They seem to overlook the fact that it is difficult to override certain settled habits of mind, which they regard as not having the same obstinacy as those of the body, and to take it for granted that the practical mechanic is as familiar with mathematics as they themselves are: they overlook the important difference that whereas professional writers are in the daily habit of employing such educated methods of reasoning, demonstration and lines of thought as an exercise, with a mind already efficiently

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[1] Quantities in mathematics are presented to the mind by symbols and are operated on by signs. Quantity is defined as anything capable of being increased, or diminished, or *measured*, and is distinguished as: (1) Abstract quality or quantity in the conception of which the idea of matter is not involved; and (2) Concrete quantity, which embraces everything that is material. The term *measured* has only a relative meaning and implies the existence of a known, well-defined quantity of the same kind, with which the unknown quantity is to be compared with regard to its extent, or other magnitude, or content; such known quantity is a standard of unity, or unit of measure.

drilled in the aptitude of the discipline of mathematical processes, and constantly living and developing in a mathematical and scientific atmosphere, these, unhappily, never have had the advantage of academic education, nor have their minds been exercised in what goes to make up the peculiar routine of *their* daily occupations by reasoning in academic fashion upon these subjects, which requires more familiarity with mathematical literature than can be expected of them; and hence their minds, not being suitably disciplined in those studies, and processes, and trains of thought, are ill adapted to follow academic methods of tuition and study, and would necessarily have an awkwardness akin to that of the initial performances of raw recruits, who are not expected at the outset to successfully perform graceful evolutions with the skill of an accomplished drill-sergeant, and it seems inconsiderate to expect scholarly aptitude under the untoward conditions alluded to.

5. Working mechanics have necessarily some general common-sense ideas — some from observation, some second-hand, and some of a traditionary character — about certain relations of the external[1] to the internal[2] forces and their resultant stresses, which have special applications to the particular class, uses and resistances of the structures, and the kind, form and arrangement of materials to which they are accustomed; but they have not always correct conceptions of the tendency of the strains produced by these relations, nor have they acquired adequate knowledge of the intensities which different sets of complex or changeable statical conditions impose on the parts of a structure, from their inability to resolve them into their component strains.

6. The writer once called attention, in the pages of a trade contemporary, to the negligent habit of plumbers and gas-fitters in carelessly notching and otherwise cutting away floor-joists, frequently sawing with indifference the cross-cuts one-half inch to one inch deeper than was really required to let in the pipe, allowing for its proper incline in the *middle* of the span, with no thought of the degree to which they thereby weakened their transverse strength and stiffness, which in the particular instance which immediately excited the above cautionary observations was done to a dangerous degree; when the result was explained to the mechanics, they expressed their surprise and innocence of any intentional indifference. This is but one of numberless illustrations within the writer's own experience, of the absence of true mechanical perception in many of the working mechanics whom we aim to reach with these remarks, but we would blame the prevailing system which entrusts men with duties beyond their known skill, rather than the individual. The writer has also found carpenters, plumbers, etc., cutting away the supports of girders, joists, posts, etc., without having the slightest consciousness of the dangers they were incurring.

7. And though we primarily address the working mechanic, we desire to present these principles to the consideration of the *student-draughtsman* who may not be familiar with the fundamental principles of static science, which so vitally underlie the pursuit of his art; hence the illustrations will be selected with regard to their application to frame structures, as well as to staging and scaffolding, while the conventional diagrams illustrating moments, and the nature of the action, and the properties of forces and strains developed in typical structures are of general application. We refer with pleasure to the admirable remarks on "Scaffolding" in the *Illustrated Carpenter and Builder*, London, of June 1, 1883, page 362, as serving to show that attention is being called, in trades similar to those we aim to reach with these papers, to the extending indications of how considerable is the growing importance attaching to the design, construction, and erection of scaffolding in England, because most of the observations are suited to this country and to the class of structures which we have been more immediately considering.

8. We ought to accustom ourselves to attach accurately-defined meanings to the terms employed in discussing physical phenomena, and to reason about them with mathematical strictness, thus obtaining clearly defined and intelligent conceptions of the facts and conclusions, and of the reasonings by which they are established.

DEFINITIONS.

9. **Matter** is the term applied to any substances in nature of which bodies are composed, and becomes known to us by their properties, as these affect our senses, as materials of any kind with which the science of mechanics is conversant, that may be acted upon by force, or can exert force.

10. **Density** is the comparative quantity of matter contained in a certain volume.

11. **Body** is any definite quantity of matter bounded in every direction, having three dimensions, length, breadth, and depth or thickness.

12. **Molecule** is the smallest conceivable division of the substance of any body possessing all the properties of the mass; it is the physical unit of matter, and would be infinitely less than the smallest possible mechanical subdivision.

13. **Mass** is the quantity of matter or volume contained within the cubic dimensions of a body.

14. Matter possesses certain properties: —

(1.) **Primary**: (*a*) *Extension; i. e.*, bodies must occupy a certain limited space. (*b*) *Impenetrability; i. e.*, the impossibility of two bodies occupying the same space at the same time.

(2.) **Secondary** properties. The most important of these, considered in relation to mechanical science, are the following: (*a*) *Compressibility* and *expansibility*, by which bodies may be made to occupy a smaller or larger space. This susceptibility to compression indicates that all bodies must contain pores or interspaces between the more solid particles of which they are composed, and that there is no substance in nature which is absolutely solid, however near to it those materials approach which we are accustomed to consider solid. Various materials differ in their density for this reason; when bodies have the same size, their densities are measured by their weights or specific gravities. (*b*) *Cohesion* is the attractive force which unites the atoms composing a body into a mass, bodies being solid, liquid or aeriform according as cohesion is modified by heat, which acts in opposition to it. In gases and vapors heat is most repellant. In liquids cohesion and repulsion are equal. In solids cohesion preponderates over repulsive force. (*c*) *Elasticity* is the power of a body to regain its normal form when altered by the action of external force, as soon as the external force is withdrawn. (*d*) *Brittleness* and *toughness* are opposite properties, the first of unyielding, the second of yielding to rapid changes of form, the latter without fracture. (*e*) *Inertia* denotes the quantity of matter by which it does not oppose active resistance to the operation of force, which can only be resisted by an opposing force, and hence motion of matter is merely the manner in which the force or unopposed part of force indicates its presence in the matter, or animates or endows it with the power of motion or of resisting, retarding or preventing motion. Inertia is therefore not an active resisting force, but is merely its passive state of yielding without opposition to the action of forces. A moving body is of itself as incapable of stopping as it is of commencing of itself to move from a state of rest. A definite time is required in which to produce, by the operation of some external force, a change from rest to motion, or from motion to rest. (*f*) *Mobility* is the susceptibility of bodies to motion, admitting of a change of place.

15. **Motion** is change of place, or of position in space, and refers in mechanics to that only which is produced by the action of an extraneous force upon a body. The laws regulating the motion of bodies, called the "laws of motion," are usually stated as follows: 1. If a body be at rest it will remain at rest, or if in motion it will move continually in a straight line and with a uniform velocity, if in either state it is not acted on by external force. 2. If any number of forces act at the same instant upon a body in motion, each force produces the same velocity in the direction of its action, just as if each had acted alone upon the body at rest. By virtue of this law is established the *composition of velocities; i. e.*, velocities can be compounded by the same laws as statical forces or pressures. Thus, in Figure 32, a body moving in the direction of *o a*, with a velocity which would bring it to point *a*, a distance of one foot or one furlong in a second of time, and at the same time moving in the direction *o b*, with a velocity which would bring it to point *b*, a distance of two feet or two furlongs in a *second*, the effect of both velocities acting conjointly is to bring the body at the end of one *second* to the extremity of the diagonal *o z*, found by completing the parallelogram. This identity of laws of composition of velocities and of forces or pressures is but natural, as velocity and pressure are only different kinds of effects reproduced by force; hence all the results of *statics* may be transferred to *dynamics*[3] by substituting velocities for pressures. 3. Law of motion: action and reaction are equal and contrary, the angle of reflection being equal to the angle of incidence, either perpendicular or oblique. There is a motion of *translation*, of *rotation*, of *vibration*, and each of them may be a *uniform* or *varied*, *accelerated* or *retarded* motion.

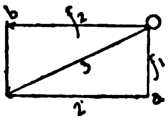

Fig. 32.

16. **Velocity** is the rate of speed of the motion with which a body passes over a unit of distance in a unit of time, and does not take into account the weight or other property of the moving body. (1) Velocities are directly proportional to the forces acting. (2) The acquired velocities are inversely proportional to the masses of the bodies. (3) The moving forces are proportional to the masses. (4) The velocity of gravitation is dependent upon vertical height of space passed through, and is not influenced by the *form* of path traversed in any oblique direction in free space. (5) With equal masses the velocities are proportional to their forces. (6) With equal *forces* the velocities are inversely as the masses. (7) With equal velocities the forces are proportional to the masses.

17. **Gravity.**—*Terrrestrial Gravitation.*—There is no force which is so ever-present with destructive tendency, and against which there is need to so watchfully contend as gravity, and hence we should have a clear perception of its nature and action. Bodies terrestrial as soon as set free fall in directions perpendicular to the earth's surface, and therefore in opposite directions, or towards the earth's centre, at places which are diametrically opposite. The earth exerts this attraction, which is termed gravitation, on all bodies within the influence of its force towards the centre of what is technically termed its mass,

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[1] External forces are those which are applied externally to a structure tending to strain or distort it as a whole, as loads, weights (including weight of structure), or any physical force exerted against the structure laterally, vertically, obliquely, etc.

[2] Internal forces are those resulting from the external forces to the different pieces or members comprising the structure, which in *skeleton structures* produce only tensile or compressive strains, tending to stretch or contract the pieces. *Skeleton structures* may be defined as those formed of members arranged in triangles, the pieces being connected together by pin joints, in contradistinction to framed or stiff joints.

[3] Dynamics is that branch of mechanics which treats of moving powers, or the action of force on solid bodies, when the result of that action is motion.

the intensity being in direct proportion to the mass, and inversely as the square of the distance. This force produces a gradually increasing velocity in a body falling *in vacuo* from a state of rest, and in order to formulate it for the purposes of calculations, the space fallen through in one second of time is assumed as the basis of the measure of the force. This, however, varies for different latitudes, though it is constant for each, but for ordinary purposes is taken at 16.1 foot (which corresponds to latitude 54° 30′). As this distance is passed over by a body which commenced to move from a state of rest it is evident that in order to obtain the element of velocity acquired at the end of one *second* double this space will represent it, and hence 32.2 feet is the unit velocity, called the *acceleration of gravity*[1], and denoted by *g*, which, strictly, is the excess of gravitation over centrifugal force of the earth's rotation. The space described in the second *second* will be double that for the first *second*, and treble for the third *second*, and so on. The law of falling bodies is only strictly true *in vacuo*, the atmospheric resistance increasing with the volume of the body; but for ordinary substances the difference is inappreciable by reason of any difference in the density.

Herschel estimated the comparative attraction of gravity at London (51° 30′) to that at equator (0°) as 100.315 to 100.000. The downward tendency is less at the equator, because of the greater opposing centrifugal force[2] there than at London by twenty-two grains to the pound. The weight of gravity of a body is therefore the product of two factors, the vertical gravitative force × the mass; and hence the difference in weight, when tested by a spring-balance, at the top of a high mountain where it is less than at its foot.

Figure 33 is intended to represent graphically (having regard to the relation of the horizontal scale of five hundred pounds to an inch to the vertical scale of 4,000 miles, *i. e.*, the earth's semi-diameter, to an inch) the proportionate diminution of the force of gravity at successive points receding from the earth, it being zero at its centre. This diminution is in the inverse ratio of the square of the distance from the earth's centre in terms of its semi-diameter, *i. e.*, more exactly 3,993 miles, thus at 8,000 miles (= 2 semi-diameters) $2^2 = 4$, the inverse value of which is one-fourth of the forces at the surface, which for convenient illustration is assumed at 1,000 pounds. The graduation outside of the circular figure representing the mass of the earth, may be taken to indicate the force of one *ray* of attraction, radiating vertically from the earth's centre as indicated by the arrow-head. The attraction acts in all radial directions. The graduation within the figure of the mass of the earth, *i. e.*, shown on the semi-diameter, represents the force of attraction diminishing uniformly in opposite directions, towards the centre, where it is neutral. Gravitation also manifests itself by the *pressure* which it causes a body to produce upon any obstacle that sustains the body at rest, and when the obstacle is removed the body is free; gravitation draws it through a certain space in a certain time.

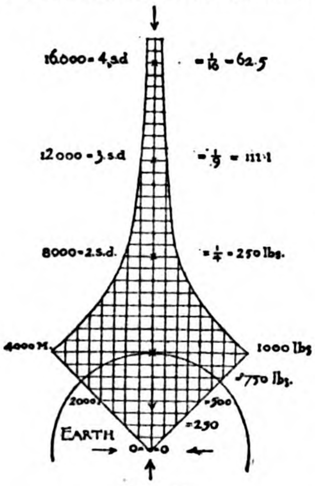


Fig. 33.

18. In all investigations regarding the effect of gravity the weight of a body is assumed to be concentrated at its centre of gravity, the mechanical effect being essentially the same for practical purposes.

THE ILLUSTRATIONS.

McMASTER HALL, BAPTIST THEOLOGICAL COLLEGE, TORONTO, CANADA. LANGLEY, LANGLEY & BURKE, ARCHITECTS.

THIS college has been erected and equipped at the sole expense of Senator McMaster. The basement is faced with gray, and the walls above in brown Credit Valley stone; the former in rock-faced ashlar, the latter random coursed. Trimmings of red brick and Ohio-stone, with black joints. Internal corridors are faced with cream-colored bricks, with red and black dado, and red frieze; ground-floor finished in butternut; upper floors and basement, clear pine. Heating by steam, direct and indirect methods. Floor and ceiling ventilation to every apartment; cost of building complete, $60,000.

This college forms one of a number of denominational colleges, in affiliation with the Provincial University, and is situated in the Queen's Park. The other colleges are St. Michael's, Roman Catholic; Knox, Presbyterian; Wycliffe, Episcopalian; and Trinity, Episcopalian. The University is considered to be one of the finest specimens of Norman Gothic in America, and cost over half a million dollars.

DESIGN FOR HOTEL, MT. KINEO, ME. MESSRS. HARTWELL & RICHARDSON, ARCHITECTS, BOSTON, MASS.

COMPETITIVE DESIGN FOR COLUMBIAN UNIVERSITY, WASHINGTON, D. C., SUBMITTED BY JOS. C. HORNBLOWER, ARCHITECT, WASHINGTON, D. C.

DESIGNS were prepared in limited competition by Messrs. Wilson Bros., of Baltimore, by Mr. Wm. M. Poindexter, and Mr. Jos. C. Hornblower, of Washington. The building was awarded to Mr. Poindexter, with instructions to prepare further designs.

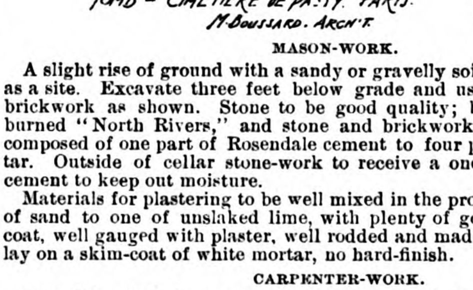
PRIZE DESIGN FOR A MECHANIC'S HOUSE, SUBMITTED BY "*Broome Street*." [MR. W. B. MOWBRAY, NEW YORK, N. Y.]

"'*Broome Street*' (third prize). This plan is larger than the two just named, and is less well arranged, as the first story extends beyond the second in the rear, the second beyond the first in front, and the partitions are somewhat scattered. The rooms are, however, well arranged around the chimney, and the house is attractive inside and outside, and has a better exterior grouping than either '*Minimum*' or '*Sweete Simplicite*." The specifications are full, and the recommendations for future expenditure, as the owner grows more wealthy, seem as if they might be needed. The drawing is good, but lacks the dash of the two preceding sketches."— *Extract from Jury's Report.*

COMPETITIVE DESIGN FOR A $3,000-HOUSE, SUBMITTED BY "*Benedick*."

"'*Benedick*' has boldly sacrificed his hall and reduced it to the merest passage, giving every inch possible to the living rooms. The dining and living rooms form a handsome suite and are well placed; not so, however, the library, whose entrance from the narrow hall is so close to the front door that it suggests a painful economy of space. There is a medium between the large halls belonging properly to spacious summer houses and the niggardly passageway with its straight flight of stairs seen so often in our narrow city houses. '*Benedick's*' error in the latter direction is the more striking since he has treated his exterior in a rustic way which has no hint of a narrow lot of land. The rounded end of the living-room is effective and gives distinction, but such treatment, it must be remembered, is the reverse of economical in construction. Fireplaces in every room are luxuries which our limit of cost will not countenance; but in general this house is simply and economically planned. The interior details are agreeable and well worked out and very skilfully drawn. We must assume that the settee in the hall is temporarily placed there for the benefit of the jury, as a hall which, including its stairs, measures only 6′ 6″, is hardly a resting-place. The drawings, as this proves, are 'knowingly' presented."— *Extract from Jury's Report.*

THE COMPETITION FOR A MECHANIC'S HOUSE.—II.



TOMB – CIMETIÈRE DE PASSY. PARIS.
M. BOUSSARD. ARCH'T.

SPECIFICATION and estimate of materials and labor necessary for the erection and completion of a small dwelling, according to plans of "*Broome Street*," architect.

The rooms, piazza and porch are nearly all under one roof, and a parlor is dispensed with, thus effecting a saving. A saving is effected by grouping the rooms around a central chimney-stack.

MASON-WORK.

A slight rise of ground with a sandy or gravelly soil will be most desirable as a site. Excavate three feet below grade and use earth to grade up to brickwork as shown. Stone to be good quality; brick to be good hard-burned "North Rivers," and stone and brickwork to be laid in a mortar composed of one part of Rosendale cement to four parts of good lime mortar. Outside of cellar stone-work to receive a one-half-inch coat of pure cement to keep out moisture.

Materials for plastering to be well mixed in the proportion of five barrels of sand to one of unslaked lime, with plenty of goat's hair. One heavy coat, well gauged with plaster, well rodded and made true and plumb; then lay on a skim-coat of white mortar, no hard-finish.

CARPENTER-WORK.

Quantities and sizes are to be as indicated in detailed estimate and on plans.

Yellow-pine is to be used for piazza and porch work and for interior finish; this is the cheapest and most durable wood to be had for the purpose. All the exterior and interior wood finish may be worked at the mill or at the building, and but little expensive carved or circular work is shown. The yellow-pine mantels and stairs may be easily made by a good carpenter. The interior yellow-pine doors are to be made from material free from pitch, and as they are to be of special pattern, may be made cheaper at the house. Few mouldings are to be used; the mould is worked on the base, trim, chair-rail, etc. A single matched yellow-pine floor to be laid in living-room, hall, kitchen, and on piazza and porch; the remainder to have single matched spruce flooring.

PAINTING.

The exterior yellow-pine finish to receive two coats of linseed oil, and the interior finish two coats of oil and one coat of varnish. The vertical shingle-

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[1] The acceleration of gravitation at equator, latitude 0° 0′ is 32.091 feet. At poles, latitude 90° 0′, it is 32.255′; the difference is .164 of a foot, or nearly 2″. For New York, latitude 46° 43′ N., it is 32.1594′; Washington, latitude 38° 54′, is 32.1558′; London, latitude 51° 30′, is 32.1912′; Paris, latitude 48° 50′, is 32.1819′; Madras, Hindostan, latitude 13° 4′, is 32.0992′. *Note.*—Half of these quantities is the space in feet per *second*, described by a body falling freely in each latitude, and is denoted by one-half *g*. For the purposes of abstract science the mass or quantity of a body, to distinguish it from mere accidental weights, is equal to $\frac{\text{weight}}{\text{acceleration}}$.

[2] The semi-equatorial and semi-polar axes are as 494 to 495, and since the centrifugal force at the equator is one two-hundred-and-eightieth of its force of gravity, while at the poles it is zero, the two forces being in opposition, there is a consequent diminution of gravity at the equator. For intermediate latitudes it is one two-hundred-and-eightieth part of force of gravity at equator × cosine^2 of the latitude. *Note.*—For explanation of *cosine* see appendix to paper X, April number, p. 160, also foot-note on same page.

work to receive two coats oil and burnt sienna stain; the remaining white-pine work to receive one priming coat and two coats white lead and oil. A saving of about $80 can be effected by this method.

The owner is to do his own grading and sodding. He will set an old molasses hogshead to catch the roof-water, and lead the pump-pipe from it; but before winter he may build a cistern, cost, $25, and lay a tile-drain to carry off sink-waste, cost, $15. Next season, when he has saved some more money, he may paint the roof two coats metallic brown and oil, cost, $12; he may fit outside blinds to the windows, cost, $26; and may replace the kitchen stove by a set range (Mott's "Defiance,") cost, $22; he may purchase three portable grates and fenders for the fireplaces, cost, $8 each, and, if possible, make connections with the local water-service.

ESTIMATE OF QUANTITIES AND PRICES RULING NEAR NEW YORK.

Excavating; 2 men and a team, to plow up and scoop out 3' below natural grade, 2 days, @ $7	$14.00
Stone-work, including chimney and piazza piers, 1057 cu. ft., @ 9 c.	95.13
9,486 good quality North River brick, @ $7 per M.	66.40
9 barrels lime, @ $1.10	9.90
5 loads sand, @ $1.50	6.00
Bricklayers and laborer, @ $4 per M.	37.94
Hauling water	6.00
693 Croton brick for kitchen fireplace, facings and hearths, @ $14	9.70
Materials and laying same, @ $7 per M.	4.85
Bluestone lintel for kitchen fireplace, 5' x 1' x 4', neatly axed, @ 40 c.	2.00
Axed hearth, 5' x 2', @ 25 c.	2.50
7 barrels Rosendale cement, for 3" concrete cellar-bottom, @ $1.10	7.70
2 men, 2 days	6.00
Water	2.00
1 barrel Portland cement for exterior plaster-panels	2.50
1 plasterer 1 day	3.50
10 barrels Rosendale cement, to add to brick and stone mortar and cement up outside stone wall, @ $1.10	11.00
657 sq. yds. plastering, @ 20 c.	131.40
Hauling water	7.00
2 10-inch tiles for chimney, @ $1	2.00
Total	$427.52

TIMBER.

Sills, spruce,	4" x 8"	334 ft.
Cellar girders,	6" x 6"	54 "
Corner posts,	4" x 6"	188 "
Braces,	4" x 4"	50 "
Plates,	4" x 6"	288 "
Bridging,	2" x 4"	200 "
First tier headers and trimmers,	3" x 10"	320 "
First tier beams,	2" x 10"	782 "
Second tier headers and trimmers,	3" x 9"	135 "
Second tier beams,	2" x 9"	672 "
Kitchen ceiling,	2" x 6"	168 "
Piazza and porch timbers,	2" x 8"	295 "
Rafters,	2" x 8"	1721 "
Second-story ceiling,	2" x 6"	325 "

Total, 5532 " @ $18 per M.	$99.57
96 hemlock joist, 3" x 4" x 16', @ 20 c.	19.20
132 " " 2½" x 4" x 12', @ 16 c.	21.12
106 ft. yellow-pine girts, 1" x 7", @ $25	1.55
1934 ft. box pine sheathing, $18	34.81
500 ft. extra box pine for cellar frames, shelving, outhouse, etc., @ 18	9.00
1022 ft. yellow-pine flooring, matched, ⅞" x 3", face, @ $30	30.66
1112 ft. spruce flooring, ⅞" x 4½" face, matched and dry, @ $22	24.46
Shingles, sawed pine, 18", 1000 to 155 sq. ft., 5¾" to weather, 2534 sq. ft. = 16,350, @ $4.50	73.57
350 ft. pine for outside finish, @ $45	19 71
1124 ft. clapboards, @ 35c.	39.34
315 ft. outside finish moulding, @ 2½ c.	7.87
18 window-frames, @ $1.75 average	31.50
25 ft. 1¼" pine for outside door-frames, @ $45	1.92
400 ft. yellow-pine ceiling, piazza and porch, ½" x 2½", @ $15	6.00
Milling	2.00
400 ft. yellow-pine for piazza-posts, rail, balusters, etc., @ $28	11.20
695 ft. yellow-pine for interior finish, door-jambs, trim, base, and chair-rail, @ $28	19.46
Mill-work for same	6.00
120 ft. 2" tub-stuff for wash-trays, @ $60	7.20
Main stairs	38.00
Cellar stairs	4.00
First story, eight 1½" yellow-pine doors, @ $3	24.00
Second story, seven 1¼" " " @ $2	14.00
Front door, 2" pine	6.00
Colored glass for same, @ $1.50 per sq. ft.	6.00
13 pr. 1½" pine sash, $2.75, glazed	35.75
4 swing sash, 1½" pine, $1.70, glazed	6.80
Four 1¼" cellar sash, $1.10, glazed	4.40
Yellow-pine for three mantels	6.00
33 ft. rear gutter, @ 12 c.	3.96
6 ft. leader, @ 10 c., and flashings	1.00
50 days, carpenters, @ $3	150.00
Total	$756.05
Painting, oiling and varnishing.	70.00

HARDWARE.

1 pr. front-door hinges	$1.10
1 front-door lock and furniture	2.30
5 mortise-locks and furniture, @ $1.25	6.25
10 rim-locks, @ $1	10.00
2 bolts, @ 15 c.	.30
8 window-catches, @ 6 c.	.48
12 sash-fasts, @ 10 c.	1.20
2 doz. window-pulls at 8 c.	.16
4 doz. H. & C. hooks	.24
300 lbs. sash-weights, @ 1½ c.	4.50
4 kegs nails, @ $4	16.00
2 kegs shingle nails, @ $5	10.00
23 pair 3½" x 3½" japanned-iron butts, @ $2.50	5.00
Screws	2.00
Total	$59.53

PLUMBING.

1 sink	$6.00
12 ft. 1" "B" lead pipe, @ 7 c.	3.36
25 ft. 1½" "D" waste-pipe, @ 7 c.	3.50
2 traps and fitting up	4.00
Total	$ 16.86
Mason-work	427.52
Carpenter-work	756.05
Painting	70.00
Hardware	59.53
Plumbing	16.86
Total	$1,329.96
Builder's profit	125.00
Total	$1,454.96
Architect's commission, 5 % of cost	$72.75
Total	$1,527.71

104 East Eighty-fifth St., NEW YORK, April 18, 1883.

I hereby propose to build the proposed dwelling according to the plans, specification and detailed estimate made by "*Broome Street*," architect, for the sum of $1,454.96. The dwelling to be built in the vicinity of New York City.

ANTHONY MOWBRAY, Builder.

The proposal is furnished by Anthony Mowbray, a practical builder, No. 104 East Eighty-fifth St., New York.

The estimate for painting was furnished by S. A. Cueman, a practical painter, No. 805 Orange Ave., Newark, N. J.

The prices for hardware were furnished by Butler & Constant, 87 Chamber St., New York City.

"*Broome Street*."

THE $3,000-HOUSE COMPETITION.—XIV.

FROM THE MUSEUM OF THE VATICAN, ROME.

SPECIFICATIONS of material and labor required for the erection and completion of frame building according to plans and details furnished by "*Benedick*."

MASON-WORK.

Foundation, 12" brick wall; brick piers; chimneys, hard brick; Philadelphia pressed-brick for stacks above roof, and for jambs of fireplaces where needed; hearths to be of 8" x 8" Spanish tiles, laid in cement; cost, eight cents each.

CARPENTER-WORK.

Heights of stories: cellar in clear, 7'; first story, 9' 6"; second story, 9'; rooms in attic, 8' 6".

Entire house shingled except under veranda, where clapboards will be used.

Floors, pine; yellow-pine for first story, hall, library and veranda.

Interior Finish, pine; bath-room, yellow-pine; newel, rail and balusters, cherry, stained; stairs, yellow-pine; library, oak.

Tank to be provided in attic.

Call-bells from kitchen and principal rooms.

Usual shelving in closets and cellar.

Plumbing:—Estimates to cover bath-room, and sinks in kitchen, and proper drains.

Painting:—Inside, three coats, except hard-wood; outside, three coats, except shingles, which will be stained with sienna; no paint on roof.

Plastering:—Instead of finishing hall for wall-paper, colored mortar, with rough finish, to be used.

ESTIMATE OF QUANTITIES AND PRICES RULING NEAR NEW YORK.

800 yds. excavation, @ 20 c. per yd.	$160.00
30 ft. digging well, @ $1 per foot	30.00
20,000 bricks (cellar foundation, chimneys and well) furnished and laid, @ $10 per M	200.00
1200 yds. of plastering, @ 20 c. per yd.	240.00
5940 ft. of timber, @ $15 per M	89.10

Plate,	85 ft.	4" x 4"
Sills,	136 "	4" x 6"
Girder,	192 "	6" x 8"
Beams,	2442 "	2" x 8"
Studding,	2100 "	2" x 4"
Rafters,	720 "	2" x 6"
Piazza rafters,	111 "	2" x 4"
Piazza sills,	144 "	6" x 6"
16 piazza posts, out of		8" x 8"

2000 ft. flooring, @ $23 per M.	$46.00
9000 ft. shingling, laid	375.00
Outside blinds (none to be used in the curved rooms)	30.00
400 ft. cornice-moulding, string-course, etc., @ 6 c.	24.00
250 lbs. felt, @ 5 c.	12.50
Nails	25.00
Other hardware	75.00
Furnace	140.00
Range and plumbing	100.00
Gutters and leaders	15.00
Window-frames	80.00
Door-frames	32.00
Sash	45.00
Glazing	60.00
Painting	150.00
Mantels	200.32
Doors	33.30
Interior finish	200.00
Carpenter-work	250.00
Incidentals of all kinds	175.00
Total	$2,785.90
Builder's profit	214.10
	$3,000.00
Architect's commission, 5 %	150.00
Total	$3,150.00

ARTISTS IN THE LEGION OF HONOR.—A French paper publishes an interesting list of the decorations bestowed upon native and foreign artists at the various exhibitions held in Paris during the past twenty years. The total number of French artists who have received the Legion of Honor is 450, divided as follows: 216 painters, of whom 171 knights, 39 officers, 5 commanders (MM. Baudry, Bonnat, Gérome, Hébert, Robert Fleury), and 1 grand officer (M. Meissonier); 82 sculptors, of whom 66 knights, 13 officers, 2 commanders (MM. Dumont and Guillaume), and one grand officer (M. de Nieuwerkerke); 142 architects, of whom 122 knights, 18 officers, and 2 commanders (MM. Bailly and Boeswillwald); 30 engravers, of whom 28 knights, 1 officer, and 1 commander (M. Henriquet). Of foreign painters 66 have been decorated, of whom 54 knights, 10 officers, and 2 commanders (MM. de Madrazo, Spain, and Stevens, Belgium); of foreign sculptors there are 11 knights and 2 officers; of architects, 8 knights and 1 officer; of engravers, 2 knights and one officer. Only one lady artist has received the coveted ribbon—Mdlle. Rosa Bonheur. — *The Architect.*

EXTERIOR STAINS.

STAINS for exterior use may be divided into two classes: first, those in which the coloring material is actually dissolved in the vehicle; and second, those which are colored with a very finely divided insoluble pigment, mixed with sufficient fixative to make it adhere firmly. Stains of the latter class are therefore merely very finely divided paints. The first class where applicable, is, in the writer's opinion, superior to the latter, as the grain of the wood in the clapboards or shingles is rather more distinctly and vividly brought out. On the other hand the number of colors is very limited which admit of this application. A few of the colors of this description which have been thoroughly tried by the writer may here be enumerated.

American Asphalt	Brown	Eosin	Red
Trinidad “	“	Dragon's-Blood	“
Resin “	Reddish “	Azo Yellow	Yellow
Aloes Gum	Greenish Yellow	Amlin Yellow	“
Yellow Gum	Light “	Methyl Green	Green
Alizarine	Red	Malachite Green	“
Annotto	“	Nigrosin	Blue Black

It is useless to extend this list farther, for the writer has tried almost all the known colors that can be brought into solution in oil. Unfortunately, of this list, only the first six are upon careful trial sufficiently fast to be used for exteriors, and of these, alizarine is too expensive at present to admit of use except for some special occasion where price is not considered. The remaining ones would many of them answer for interiors, but the combination of rain and sunlight disposes of them outside too easily. We are therefore limited to a very narrow range of colors of this character, and must turn to the second class of colors, viz., those consisting of insoluble pgiments with a fixative to hold them onto the fibre of the wood. With these we can obtain almost any desired shade, and if properly ground pigments and suitable vehicles are used, effects can be obtained almost equal to the colors of the first class in respect to showing the grain of the wood. The writer has found the best pigments to be pure oxides of iron (exceedingly finely ground) for the reds, yellows and browns; pure chromate of lead for lemon yellow; mixtures of these with black and blue pigments for greens and olives. The greatest care should be used in selection of pure and very fine pigments. For a vehicle the best seems to be a purified creosote oil, which practically renders the wood imperishable and is moreover comparatively inexpensive. Linseed oil may of course be used, but it has one difficulty which every one must remember who has seen a lot of old painted shingles taken down. Just behind the butt of the shingle or clapboard is seen a deeply corroded or decayed spot upon the under side where the water has been held in between that shingle and the next by the paint which forms a *cul-de-sac* in which the moisture collects and causes the decay; this is due to the “skin” formed by the drying of the linseed oil, and is not to be found if creosote oil be used in place of linseed. In conclusion the writer would say that he thinks the best way of treating either a clapboard or shingle is to dip about two-thirds of it in the stain, which should be kept well stirred. It should then be allowed to drain back into the pan or barrel by being put into a wooden trough tipping backward, and then should be thrown out onto the grass or clean ground to dry for three or four days. Many houses are built in which the shingles are stained and the clapboards painted. The result would be much finer if both were stained, for stain has the effect of making the whole side of a house look as if it were treated in detail, so great is the beauty and variety of the grain of the wood, while paint reduces the whole to a monotony in which the color *en masse* is the only effect. Any inquiries which the writer can answer will receive the attention of Yours sincerely, CHEMIST.

CHANGES AT MONT ST. MICHEL.—The fate of Mont St. Michel in Brittany still forms the subject of a brisk interchange of notes between the Ministry of Fine Arts and the Ministry of Public Works, and the real point at issue is now beginning to appear. On the one hand it is admitted that the dike which has been constructed from the mainland by the Ministry of Public Works need not really imperil the safety of the buildings, for these could be easily protected by some additional buttresses; but, on the other hand, it is confessed that the dike is only the thin end of the wedge, and that the real object of the department is to gradually reclaim the whole of the *grève*, 35,000 acres in extent, just as the neighboring marshes of Dol have already been reclaimed. The famous mount would then raise its spires and towers above “a sea of corn, now green, now gold, alive with men and beasts of burden, and even traversed perhaps by a railway;” moreover the work would really be one of “restoration,” for there was no doubt a time when the sea had not submerged the ground between the mount and the mainland. All this, however, fails to convince the “unpractical dreamers” in the Ministry of Fine Arts, who claim the custody of Mont St. Michel as a historical monument, and declare that its incorporation with the mainland would destroy its artistic merit. One may at any rate be glad that the incorporation, for which there is certainly a great deal to be said, had not been carried out before Clarkson Stanfield's drawing and Mr. Haig's etching. — *Pall Mall Gazette.*

THE ART OF VENEERING.

IT is not intended in this article to enter into an account of the merits or defects of veneered work, or to reply to the severe remarks that some writers upon furniture design have thought fit to make respecting it, but to at once proceed to describe the various operations in a concise and practical manner, commencing with the

PREPARATION OF THE GROUNDWORK.

A wood suitable for veneering requires to be thoroughly well seasoned, free from knots and shakes, and should not contain turps. The best of woods for the purpose are mahogany and American walnut, although good pine answers well for ordinary purposes. The surface, if flat, is carefully planed up with the trying-plane. It is then well toothed over with the toothing-plane — first, the lengthways of the grain of the wood, and afterwards crossways, care being taken to tooth the work *thoroughly.* If you are working pine, use a coarse toothing-iron; if mahogany or other hard wood, a finer iron is requisite. If the work presents a hollow or rounded surface, it is shaped with suitable planes, rasps and files, and finally well papered crossways with coarse glass-paper (strong 2 or 2½).

The next operation is *sizing.* To make your size, take one part of good Scotch glue, and boil it well with fifty parts of water; then brush over the groundwork while hot, allow to dry, and if there should be any defects in the groundwork, fill in with *stopping.* Make your stopping by mixing some finely-ground plaster-of-Paris with hot glue and water, enough to form a moderately-stiff paste; then lay in where necessary with a chisel, taking care to allow for shrinkage; let it dry, then level off with a rasp.

PREPARATION OF THE VENEER.

Having sized your groundwork over, you may proceed to the preparation of the veneer whilst it is drying. Look carefully at your wood before cutting it, and see that you do so in such a manner as to get the grain of it to the best advantage. Cut it rather larger than the surface you intend to veneer, to allow for levelling at the ends and sides. Most veneers, such as mahogany, oak, chestnut, maple, sycamore, birch, satinwood, and various other woods are ready for cutting as received from the merchant; but some, like burr-walnut, brown oak, Amboyna, etc., present an uneven surface called *backly.* When this is the case, damp one side with clean water, lay it down with its *dry* side upwards, and put the *wet* side of the next veneer upon it, repeating the operation till all are done. Take particular care to keep each veneer, if you have more than three or four, in its proper order, as you damp and turn over, and do not on any account get them mixed. Let your wood stand about five or six hours, then spread out and allow to nearly dry, and they will be ready for cutting out.

The next process is *flatting.* Get two pieces of wood (dry straight pine will answer well) rather larger than your veneer, and heat them on a stove or before a bright fire; then place the veneers between them, handscrew together, and allow it to remain for about half an hour; then repeat this operation until the veneer is *perfectly dry* and thoroughly flat.

Our wood is now ready for *filling in.* If it is perfectly sound, this operation is of course unnecessary; but it frequently happens, especially with burr-walnut, that it contains holes that require filling. To do this, take a piece of the veneer (off the edges of that already cut out) and flat it precisely as the other. Select the part of it which matches best with the grain of the wood around the hole required to be filled in; place this piece underneath the hole. If you have a stump rather larger than the hole, you may now cut it square or circular, and the piece for filling it at the same time; if not, take an ordinary pocket-knife having a sharp point, and cut your hole and veneer the required shape. When you have filled in your wood, lay it on a flat board, then press your pieces in with a hammer. If they are rather large, you may use one or two fine-pointed tacks to keep them in position. Now cover all your pieces with strips of paper. Select a strong paper for the purpose, one that is not too thick; copy-book or note paper answers well for the purpose. Glue it on one side, taking care to use the glue just thick enough to hold your wood in position. Pay particular attention to this, or it will cause you a good deal of trouble. You will find it best to cut the paper in strips about one and one-quarter or one and one-half inches wide. Lay it on a board to glue, and smooth it over your veneer with a damp rag.

We now proceed to *jointing.* Place your veneer in the position it will appear in when laid. Observe that it *matches.* If you are to have one joint with two veneers, or two joints with four veneers, see that the grain of the wood forms a figure having both sides alike; if you have kept your veneers in their right or following order, this will not be difficult. If you are working a thick veneer (saw-cut), make your joints with an iron plane or ordinary trying-plane on the shooting-board; if using a thin veneer (knife-cut), make them with

a chisel and straight-edge. Take *particular care* to have *the bevel edge* of the chisel against the straight-edge when cutting, or it will run, and you may come off with an ugly cut. Now put the jointed edges together on a deal board. Tack one edge down; put the tacks about three-fourths of an inch from the jointed edges, and about two and one-half inches apart. Having tacked one piece down, put the other up to it, and tack in the same manner. Now cover all the joints with paper, glue in the same manner as previously mentioned for the filling in, smooth it well down with a damp rag, and allow to dry. If the weather is hot it is best to cover your joints, to prevent them drying too quickly. A good and simple method is to lay your board with the veneer downwards on the floor. Let the joints dry, then take out the tacks and knock the tack-holes up with hammer from the underneath side. Put the veneer aside until you are ready for laying it; it is best to cover it up and keep the air from it by placing it under a board or wrapper.

There are two ways of laying veneer: by means of a caul or a veneering-hammer. I shall describe both methods, although the first is of greater importance, and should, wherever practicable, be adopted; but in certain cases which I shall mention, the second is extremely useful.

VENEERING BY CAUL.

In the first place, to make a *caul*, take a well-seasoned piece of cedar or pine, rather larger than the surface you intend to veneer (about one inch or one and one-half inches each way), and plane it up true on both sides if the work is flat; if otherwise, make it the requisite shape to fit the work, hollow, round, or whatever it may be. If you have to shape your caul you should use thicker stuff, and it is advisable to screw two or three battens on the back. When making shaped cauls, it is best at the same time to get out the pieces of wood necessary to form a flat surface when the work is put in the caul. Thus, suppose we want to veneer a door having a rounded surface on one side, and a hollow one on the other; we have made a *hollow* caul to correspond with the *rounded* surface, having its under side flat; now put the round side of the door in the caul, and shape your pieces of wood, *rounding* to fit the *hollow* side of it. They should be two inches wide, the same width or a little wider than the caul, and five or six inches apart. If one side only of the work is shaped, these woods are unnecessary. If your wood is not wide enough, make a good joint, dowel it together, and only glue the dowels into one side, so that you can take it to pieces for heating. The caul, if likely to be much in use, should be covered with zinc. Cut the metal out large enough to cover the face of it, with sufficient to turn over the edges and ends, and fasten it on with flat-headed zinc or copper nails.

GLUE.

Numerous failures in unaccustomed hands may be ascribed to the use of *bad* glue. Nothing but the *very best* glue should ever be used for veneering. Get the best Scotch glue you can obtain, break it up and boil thoroughly. It differs so much in strength that the proportion of water suitable for it can scarcely be given; but after breaking up in pieces, just cover with water and allow it to soak, then boil off with frequent stirring. It will, if good, now require about half as much water as previously added, to bring it to the right consistence for veneering; it should spread evenly under the brush and be free from lumps. Having made the caul and prepared the glue, get the handscrews and cramps ready and commence laying. Heat the caul on a stove or before a bright fire. If it is doweled together, and if it is more convenient, take it to pieces, taking care to mark your joints first. If you intend laying two similar pieces of veneer on flat surfaces, heat both sides of it, and do both of them together; if not, get one side of it well heated as hot as you can without letting it burn; while it is heating, set the handscrews and cramps open as near the distance as you will require them, and place handy to your work. Now glue your groundwork well, and if your veneer shows any inclination to be *backly*, glue it slightly on the underneath side, as this will help to soften it (remember the jointing paper on the veneer is laid on the *outside*). Having finished gluing, put the veneer on the work, and smooth it gently over with the hand. Then see that the caul is hot enough, and its surface free from any small cinders or dirt; now rub it over with a greasy rag, and lay it gently on your veneer. Draw your work and caul a little over the front or end of the bench, just enough to get the handscrew on; put it on very gently, then tighten as much as possible. You can then stand it upon the floor, and if you have not any one to hold it for you, rest the handscrew against your bench while you put on the remainder. They should be placed about six inches apart, and mind that they *bite fairly*. Do not get one screw tighter than the other, or you will only get the pressure at the outside or inside of the chaps. If you have a piece of work so wide that the screws will not well reach its centre from either the sides or the ends, get two pieces of wood, two inches or two and one-half inches thick, and about the same width as thickness, plane them up, slightly rounding on one side; put their *rounding* sides, facing each other, on the work, and handscrew them at *each end*; they will then tighten in the middle and give sufficient pressure. Let your caul remain on for an hour — in very hot weather longer will not hurt; then undo the handscrews, and if the caul sticks, insert the edge of a thin metal square, the back of a handsaw, or anything of a similar nature, between it and the veneer, and work it carefully about till you get them apart. If you have used the glue thick enough, and greased the caul well, you will not have much trouble, and they will often come apart themselves, or by giving the end of the caul a tap with a hammer or on the bench. See that the veneer is down; feel it all over with your hand. If it is up, you will be able to tell by the hollow sound on tapping it with the tip of your finger, as well as by the raised appearance, termed *blisters*, it will present when held in the light. If you heat your caul sufficiently, use your glue thick enough, and put the handscrews on properly, you will not be troubled with blisters; should there, however, be any, let the work stand about one or two hours, and then put a smaller hot caul on where required, until well down all over.

To *level* the veneer, first lay it (veneer side downwards) on a board, and scrape off with a chisel as much of the glue that has come over the edges as you can. Now put it in the bench-screw, and level towards you with a paring-chisel, if thin veneer; if thick, use a smoothing-plane. Put it aside to dry. If you have two pieces the same size, put them with their veneered sides together; if only one, place it so that the air does not get at the veneer. Allow to stand two or three days, then scrape off the paper used for filling-in pieces and jointing with a chisel, having previously damped it with hot water. The work is now ready for sizing; this operation may be dispensed with, but it is decidedly advantageous, especially if you are working wood having an open grain. The size, which should be about the same strength as that used for the groundwork, is brushed or rubbed over the veneer with the hand, then wiped off as dry as possible with a cloth.

VENEERING BY HAMMER.

As I have already mentioned, this method of veneering is useful in certain cases. We sometimes want to veneer an edge, or put a narrow strip of veneer on some small surface, where it would be very inconvenient to caul it down. If we are working a wood of a glossy or greasy description (like satinwood or rosewood), its nature will not admit of sufficient pressure by this process, nor should it ever be adopted for work where water will act injuriously. I believe the prevailing opinion is that veneer requires a good deal of water to make it lie. In the first process, you will remember that it is laid *quite dry*. In the second process water is used, and if we consider that a damp surface tends to cause the wood to cast as it dries, we can readily understand where it should be used. — *T. H. S., in the Building News.*

MONTHLY CHRONICLE.

June 6. Grain elevator of Manigold Brothers & Kershaw, Milwaukee, Wis., bursts. Seven men supposed to be buried under the grain.

June 8. Powder mills near Newburgh, N. Y., struck by lightning. One man killed.

June 9. Burning of the Gaiety Theatre, Manchester, England. The building was empty at the time.

June 13. Fall of the roof of J. L. Haven's factory, Cincinnati, O., during repairs. Four men injured.

June 14. Cyclone on Long Island, N. Y.

June 16. Burning of Gray's Opera-House, Boston, Mass., early in the afternoon. The audience escapes unhurt.

Panic of children assembled in Victoria Hall, Sunderland, England. Two hundred and two children of all ages crushed to death.

June 25. Burning of a place of amusement at Dervio, Italy. Forty-seven persons burned to death.

NOTES AND CLIPPINGS.

Rembrandt's "Advocate Tolling." — There has just been sold in London a famous print of Rembrandt's, which is either the identical impression or the one other example not in a public gallery, of which a celebrated story is told in Charles Blanc's book on Rembrandt. At the Pole-Carew sale in 1835 all the great amateurs of that day were assembled, and the almost unique "first state" of the "Advocate Tolling" (as the print was then called) came on. Mr. Pole-Carew had given £56 for it, but the biddings soon rose to £150, then to £200. At this point a foreign gentleman rose and addressed the assembly. "Gentlemen," he said, "I am an old man. I am the Chevalier de Claussin, author of a catalogue of Rembrandt's works that is in the hands of all of you. I have sought this print for twenty-five years; if I miss it now I shall never get another impression. I have only £200 in the world! A little pity, gentlemen; let it fall to me!" There was a moment of compassion: but who is really self-denying at such a time? Other competitors bid, and the print was knocked down at £220 to M. Verstolk van Soelen, Minister of State in Holland.

A Landlord's Responsibility. — A bank had several tenants in its building, one of whom occupied an upper room in which there was a water-bowl with a faucet, but the apertures for the escape of the water were not sufficiently large to carry off the water at night if the faucet was left open, the pressure being then much greater. This faucet was left open negligently by the tenant at night, and the water overflowed and ran down upon and injured the goods of another tenant who sued the landlord for damages on the ground of negligence in putting in an insufficient bowl. In this case the Supreme Judicial Court of Maine reversed the judgment below in favor of the plaintiff. Judge Symonds in the opinion said: "Legal liability of the landlord for negligence does not result from the facts in this case. If the landlord of an upper tenement should cause a faucet of proper construction and capable of safe use with due care, but without any overflow at all, to be put in only for the purpose of drawing water, there would be no conclusion of law from that fact, without other evidence, that the landlord was negligent and liable for the damages resulting from his tenant's carelessly leaving the faucet open." —*Sanitary News.*

SAFE-BLOWING EXTRAORDINARY.— The National City Bank, after employing five different experts continually day and night since last Friday morning in attempting to get its vault open, as a last resort to-day tore it out of its brick and stone encasement and conveyed it to the works of the City Forge and Iron Company, where it was blown open with dynamite. In order to remove the vault it was necessary to remove the plate-glass windows of the bank. The time-lock of the safe had become deranged, and showed how impregnable an arrangement it is by successfully resisting the efforts of all the experts.—*Cleveland* (*O.*) *Leader*.

THE SEVEN SUPREME COLORISTS. — The art of color, in which Giorgione discovered himself to be so masterful, is one of the proudest functions and faculties of the painter, if not in some respects the ultimate one. "To color perfectly" says Mr. Ruskin, "is the rarest and most precious (technical) power an artist can possess. There have been only seven supreme colorists among the true painters whose works exist, namely, Giorgione, Titian, Veronese, Tintoret, Correggio, Reynolds, and Turner; but the names of great designers, including sculptors, architects, and metal-workers, are multitudinous." It is in the same connection that Mr. Ruskin observes: "If these men" (the Venetian painters) "laid architecture a little under contribution to their own art, they made their own art a glorious gift to architecture, and the walls of Venice, which before, I believe, had received color only in arabesque patterns, were lighted with human life by Giorgione, Titian, Tintoret, and Veronese. Of the works of Tintoret and Titian nothing now, I believe, remains; two figures of Giorgione's are still traceable on the Fondaco de' Tedeschi, one of which, singularly uninjured, is seen from far above and below the Rialto, flaming like the reflection of a sunset." — *London Society*.

COMPRESSED AIR AS A MOTOR. —*The London News* of the 17th ult., states that the day before a practical trial was made of the British Mékarski Company's improved air-engine, applied to the propulsion of street tram-cars. The experiment was made with the approval of the local authorities under a board of trade license, on the line of the Metropolitan Street Tramways Company from Camden road, Holloway, to King's Cross, a distance of about two miles. The engine claims superiority over other inventions of the same kind in the passing of the compressed cold air through hot water, and so giving it reëxpansive power and force. A reservoir, not much larger than an eighteen-gallon cask, is fixed at each end of the car, on the platform occupied by the driver; and, under his control, mechanical driving gear to the weight of ten tons, fixed under the car and protected by iron skirting, propels the car. The reservoirs are charged by steam power at the depot to the extent of a pressure of four hundred and fifty pounds on the square inch, and require recharging after each return journey. The experimental test, with a car laden with directors and visitors, was perfectly successful. No attempt was made at any more than ordinary speed, nor did this comparatively novel mode of travel attract more than passing attention even from horses, whose aversion to the rival power of steam on roads is sometimes dangerously evident. Assuming the steady and continuous working of the engines and mechanism, the main drawback to permanent supersession of the clumsy and costly horse service seems to be the difficulty of clearing, or rather circumventing, obstruction through the breakdown of any ordinary vehicle on the line. In that case, while the horse-car can at some small inconvenience in the way of jolting be drawn from the line over the roadway, the engine car must either be a dead block or must carry off the obstruction by a cowcatcher. The engine has worked four years in Nantes without any serious breakdown. This trial included a length of one hundred yards or more over a canal bridge where the gradient is one in twenty-seven.

PEAT. — Peat or turf is composed of various kinds of plants which are undergoing a gradual transformation by a process of slow burning or carbonization, in which the oxygen of the plant is being liberated under special conditions of moisture and heat, leaving a spongy carbonaceous mass in which the remains of the plants are often so well preserved that the species may be easily distinguished. The formation of peat may be regarded as one of the most important geological changes now in progress. In color the combustible varies from a yellowish-brown through all graduations to a very dark brown — almost black. The former is light in structure, spongy and fibrous; the latter is more compact and pitchy in its appearance, the fibrous texture being almost entirely obliterated. In advanced stages of decomposition it is compact and dense, presenting an earthy fracture when broken. In general, the darker the peat the richer it is in carbon.

Peat formations are confined to cold and temperate climates and swampy ground. In its natural and advanced state, the material contains about three-fourths of its weight of water. In the earlier stages of decomposition the quantity of water present often amounts to as much as ninety per cent of the whole weight, and is totally unfit for any of the purposes for which the fuel is used. Owing to the abundance, cheapness and superior heating power of coal, peat has not found much favor in this country. In Ireland, Germany, Sweden and several other foreign countries, however, it is largely used not only for domestic, but also for metallurgical purposes. In a French report on the use of peat as a fuel for locomotives, after experimenting on a large scale the conclusion was reached that an economy of nearly one-half might be effected over a similar mileage and tonnage with coal, setting aside the greatly reduced injury to boilers, flues and grates. It is also claimed for peat in this report that the firing, once understood, is much more easily managed than with coal, no stoking being required, and the heat being more regular and not subject to the constant changes in intensity that occur so frequently with coal and coke. The charcoal produced by the carbonization of ordinary air-dried peat is very friable and porous, takes fire very readily, and, when once ignited, nearly always continues to burn until its carbonaceous matter is wholly consumed. It scintillates in a remarkable degree when burned in a smith's fire, and its extinction when in mass is difficult. From this arises the difficulty in its manufacture by the usual method of carbonization in piles, and it is so little coherent that it cannot be conveyed without much of it being crushed to dust. — *Metal Worker*.

IN THE CHANNEL TUNNEL — A tall shaft, a steam-engine, an air-locomotive and a couple of wooden shanties mark the spot destined, it may be, to abut upon the English mouth of the Channel tunnel, or rather of a Channel tunnel — for there are other schemes afoot to join London and the extremest point of the Continent of Europe in a continuous railway journey and without change of carriages. Sir Edward Watkin airily calculates that the cost of the enterprise in which he is interested would amount to three millions sterling, and that the tunnel would allow the passage of 250 trains each way every day, at an average speed of forty-five miles an hour. So that the tunnel of twenty-two miles in length might be traversed in half an hour — a speed, be it said, very much higher than that kept up in the longest tunnels of the St. Gothard between Switzerland and Italy. At the bottom of the shaft, at the mouth of the boring, no more than seven feet in diameter from end to end — excepting here and there a somewhat wider square opening, technically called "a turn-out" — we found a couple of trollies, fitted with seats on either side, after the manner of the tram-cars of the military train familiar to habitués of Wimbledon camp. Running along the sides of the trolly, close to the ground, was a footboard like that attached to a railway carriage, and above the seat was a semi-circular hood, lined with red baize, sufficient to protect the head and shoulders from dripping wet or particles of falling débris, but not wide enough to save the legs and feet. By reason of the space taken up in the lower arc of the circle, so as to make a level floor, along which the rails were laid, it was necessary that we should sit with knees drawn up and heads bent during the whole time occupied in journeying to the face of the tunnel and back again. A Rembrandt or a Salvator Rosa might have done pictorial justice to such a scene. Under foot for a great portion of the way the ground is almost ankle-deep in slush; and the stalwart fellows who drag and push the trollies — trudging manfully along — have enough to do to keep their foothold. The travellers, for the greater length of time, moving through a dim twilight, cannot well make out the features even of those who sit beside them. Now and again the little electric lamps, set in rude niches of the naked gray chalk, cast a brilliant but fugitive light on the passing train. Then, for awhile, all is again but darkness visible. There are shadows above and beneath and all around. Looking backward or forward, through the deepening gloom, the traveller sees an ever receding, seemingly endless funnel-shaped perspective, lit at long intervals as with fiery eyes. Onward, and yet onward — to no sound save the splashing made by the tall workmen tramping through mud, and the drip, drip of the water upon the hood above our heads — we are dragged and pushed beneath the shingle and the sand of the shore for a time level with the beach, and then down a quarter of a mile deep, past low-water mark under the bed of the Channel. The bore has cut clean through the gray chalk in a circle as round and true as the inside of a wedding-ring. So thoroughly, indeed, is the instrument adapted to the work and to the material that in dry places it is possible to see the chisel-marks made a couple of years ago. At intervals along the route, where it is feared the water might come through, the sides and roof have been packed with lead or clay, and held up with solid iron bands apparently about eighteen inches wide. Sometimes, in the fitful flashes of light, the eye rests upon falling red rivulets, like streams of blood, pouring down the damp walls. Ever and anon there are "faults" in the clayey chalk not yet remedied. So we go on and on, moments seeming as minutes, until the electric lamps cease altogether, and the long, awful cave is enveloped in a darkness which would be impenetrable but for the glimmer of a few tallow candles stuck into the bare walls of the cutting. Even a mile and more from the mouth of the shaft it is not difficult to breathe; for the same machine which works the bore pumps drives a continuous supply of fresh air into the seven-foot pipe which at present forms no more than the nucleus of a tunnel. At a distance of 2,300 yards from the pit-mouth we come upon the simple and wonderful piece of machinery which can pierce through the bed of the sea with extraordinary celerity and at a cost cheaper than is required for the making of an ordinary tunnel under a hill. By permission of the President of the Board of Trade the engineer is allowed to make a couple of turns in order to show our party the method of its working. Presently we remount our not too comfortable carriage; and pass stooping, once more, along the fearsome narrow way; pass by spaces of horrible shadows and glimpses of welcome light. And finally we are swung up through the shaft into the outer air, where the glad sunshine catches the tall cliff's face and bathes the smiling and yet unbetrayed Channel in an atmosphere of golden glory.—*The London Daily Telegraph*.

A NEW RAPHAEL. — The London *Pall Mall Gazette* in a recent issue says: "The gallery of the Louvre has just made an acquisition which reflects great praise or great blame on our authorities at home. The number of Raphaels in the world is very few. and in a fortnight a new Raphael will be hung in the 'Salon Carré.' If the work be genuine, it is sad to think, not only that it might have been ours, but that it actually was ours. In 1850 it was sold at Christie's, and subsequently passed into the hands of Mr. Morris Moore, who has just sold it at Rome to the authorities of the Louvre for £8,000. It is understood one of the conditions of sale was that the picture was to hang in the gallery of honor, close to the other Raphaels which make the glory of the Paris collection. It is only recently that this 'Apollo and Marsyas' has been definitely attributed to Raphael. So long as we had the picture the ascriptions of authorship were very varied, and included Mantegna, and Francia, and the Florentine painter, Francia Bigio, whose well-known picture, for many years fathered on Raphael, and now in the Louvre, will probably make way for the last acquisition. It was the discovery of a cartoon in Venice a few years ago which established the authenticity of the new Raphael."

A CEMENT FOR GLASS AND METAL. — Those who use brass letters on glass windows know how often they drop off from unequal expansion, or from the too-energetic efforts of window cleaners. They will be glad to have the following recipe: Litharge, two parts; white lead, one part; boiled linseed oil, three parts; gum copal, one part. Mixed just before using this forms quick-drying and secure cement. — *Exchange*.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

279,917. Screw-Driver. — Frederick J. Colville, Hamden, Conn.

279,930. Key-Fastener. — Wm. H. Flinn, Nashua, N. H.

279,932. Combined Lock and Latch. — Theodore Friedrick, Ottawa, Ontario, Can.

279,943. Wash-Basin. — Arnold C. Hawes, Noroton, Conn.

279,952. Faucet. — Joseph Kaufmann, New York, N. Y.

279,975. Hand-Saw. — David A. Neidig, Canton, O.

280,002. Burglar-Alarm. — William H. Wright, Atlanta, Tex.

280,009. Automatic Fire-Extinguisher. — Jas. W. Birkett, Brooklyn, N. Y.

280,017-018. Water-Closet. — Chauncey N. Dutton, Washington, D. C.

280,024. Chimney and Ventilating Flue. — William P. Esterbrook, New York, N. Y.

280,034. Metallic Skylight. — George Hayes, New York, N. Y.

280,035. Transom-Lifter. — George Hayes, New York, N. Y.

280,036. Skylight. — George Hayes, New York, N. Y.

280,055. Door-Check. — Thomas D. McCurdy, Lancaster, Tex.

280,065. Fire-Escape Cable. — Abraham O. Morford, Port Chester, N. Y.

280,070. Fire-Escape. — William Newland, Brooklyn, N. Y.

280,073. Calipers. — Andrew Nimmo, Bristol, R. I.

280,085. Rain-Protector for Chimneys and Roofs. — Isaac Sage, Pleasantville, N. J.

280,092. Ventilator. — Frank R. Siltz, Leon, Io.

280,099. Pipe-Wrench. — John J. Tower, Brooklyn, N. Y.

280,108. Water-Closet. — Thomas Wilson and Chauncey N. Dutton, Washington, D. C.

280,111. Eaves-Gutter. — Hosea I. Aldrich, St. Helena, Neb.

280,113. Floor-Clamp. — Frederick E. Allen, North Grafton, Mass.

280,136-137. Cock or Faucet. — Wm. S. Cooper, Philadelphia, Pa.

280,151. Elevator. — Andrew M. Dungan and Milton Lacrone, Springfield, O.

280,152. Floor-Plank Clamp. — Grafton H. Duvall, Philadelphia, Pa.

280,154. Transparent Blower for Fireplaces. — John W. Edmonds, New York, N. Y.

280,155. Mercury-Seal Trap. — Abraham Edwards, Asbury Park, N. J.

280,175. Match-Plane. — Philip Hickey, Boston, Mass.

280,180. Water-Closet. — Elias S. Hutchinson, Washington, D. C.

280,193. Sewer-Trap. — William W. Lemmon, Portersville, Ind.

280,226. Pivoted-Jaw Vise. — Andrew J. Odom, Sumner, Ga.

280,231. Fire-Escape. — Aaron Palmer, Rochester, N. Y.

280,243. Cistern for Water-Closets. — John Reid, Brooklyn, N. Y.

280,251. Elevator. — Uzziel P. Smith, Chicago, Ill.

280,261. Door-Securer. — Thomas E. Tateum, Worcester, Mass.

280,271. Brick-Drying Apparatus. — Nathaniel S. Willet, Newark, N. J.

280,275. Water-Waste Preventer for Flushing Water-Closets. — Charles Winn, Birmingham, County of Warwick, England.

280,292. Sash-Holder. — William P. Clason, U. S. Navy.

280,294. Fire-Proof Structure. — William Corliss, Providence, R. I.

280,306. Fire-Escape. — John Gowdey, Janesville, Wis.

280,316. Brick-Machine. — Lewis B. Kennedy, Keokuk, Iowa.

280,326. Mortising-Machine. — Lyman O. Orton and Lucien H. Berry, Philadelphia, Pa.

10,346 (*Reissue*). Apparatus for Ventilating Water-Closets. — Frederick Hainsworth, Chicago, Ill.

SUMMARY OF THE WEEK.

Baltimore.

Dwellings. — Thos. Dixon, architect, has prepared drawings for Mrs. Mary M. Wagner, for 2 three-st'y brick, stone and terra-cotta houses, to be erected on n s North Ave., e of Park Ave., each 24′ x 64′, to cost $15,000; Lewis H. Robinson, builder.

The labor market quotations for the month of July remain unchanged, same as for June.

Building Permits. — Since our last report sixteen permits have been granted, the more important of which are the following: —

Mrs. Karter, two-st'y brick stable, in rear of No. 9 East Biddle St., between McDonough and Ann Sts.

Omitta Green, two-st'y brick stable, in rear of n e cor. Park Ave. and Wilson St.

B. & O. R. R. Co., one-st'y brick roundhouse and car-shop, s w cor. Pratt and Poppleton Sts.

Robert Garrett, two-st'y brick stable and extension to greenhouse, in rear of Nos. 69 and 71 s s Mt. Vernon Pl.

A. Hamilton, 4 three-st'y brick buildings, n s Lafayette Ave., between Calhoun and Carey Sts.

Marion H. Ould, two-st'y brick bakehouse, w s Morris Alley, between Preston and Rose Sts.

Boston.

Monthly Report. — During the month of June, 17 permits for brick and 105 permits for wooden buildings were issued in Boston, at the office of Inspector of Buildings.

Building Permits.—*Brick.—Hamilton St.*, cor. Wendall St., Ward 12, for Moses Kimball, mercantile building, 28′ 2″ x 30′ 3″, four-st'y flat; James Smith, builder.

Middlesex St., No. 10, Ward 16, for J. C. Haynes, tenement, 40′ x 40′ 2″, four-st'y flat; G. W. Pope, builder.

Stillman St., Nos. 25-29, *North Margin St., No.* 32, *Cooper St., No.* 32, *rear*, Ward 7, for John G. Williams, parochial school, 68′ x 80′, five-st'y hip, ell, 25′ x 56′ and 71′; Frank Jones & Son, builder.

Wood.—Delle Ave., near Parker St., Ward 22, for C. H. Proessdorf, 2 dwells., 16′ x 21′ and 24′ x 31′, three-st'y flat; Robert D. Ward, builder.

M St., Nos. 159-161, Ward 14, for Wm. T. Eaton, dwell., 20′ x 44′, dwell. and store, 20′ x 44′, three-st'y flat; W. T. Eaton, builder.

Tremont St., Nos. 26-34, Ward 3, for Charles Robinson, Jr., 5 dwells., 13′ 6″ x 30′ and 20′ x 34′, three-st'y flat; Geo. M. Starbird, builder.

Delle Ave., near Parker St., Ward 22, for Hannah Fitz Patrick, dwell., 20′ x 27′ and 24′ x 32′, two-st'y mansard; R. D. Ward & Co., builders.

Greenwich Pl., cor. Fenton Pl., Ward 24, for Wm. A. Burrell, dwell., 23′ x 36′, two-st'y flat; Wm. J. Jobling, builder.

Clifton St., near Cottage St., Ward 20, for Miss Kate Maguire, dwell., 25′ x 29′ 6″, two-st'y pitch; F. S. Crosby, builder.

Washington St., near Williams St., Ward 23, Jas. Dolan, dwell. and store, 27′ x 34′, two-st'y pitch.

Sullivan St., No. 50, Ward 3, for Sarah M. Jones, dwell., 22′ and 24′ x 36′, three-st'y flat; J. W. Jones, builder.

Heath St., rear of, near Bickford Ave., for Francis Bleiler, stable, 24′ x 38′, one-st'y pitch; Robert D. Ward, builder.

Marion St., No. 194, Ward 1, for Henry Kenway, storage, 22′ x 50′, two-st'y flat, Henry Kenway, builder.

Cedar St., No. 11, Ward 3, for Wm. Murray, dwell., 21′ x 51′, three-st'y flat; John F. Wilson, builder.

Cottage St., rear, near Norfolk Ave., Ward 20, for Henry L. Batchelder, mechanical, 12′ x 17′, one-st'y pitch; John M. Stinson, builder.

Havre St., No. 70, Ward 2, for Sisters of Notre Dame, stable, 21′ 6″ x 40, one-st'y mansard; Holmes Bros., builders.

Errickson St., rear, opp. Fulton St., Ward 24, for Putnam Nail Co., stable, 39′ x 64′, two-st'y pitch, Putnam Nail Co.

Winslow St., near Zeigler St., Ward 20, for Warren Lathrop, dwell., 31′ x 51′, three-st'y flat; Henry G. Allen, builder.

Gardner St., near Baker St., Ward 23, for Highland Ice Co., dwell., 21′ and 33′ x 28′ and 34′, one-st'y pitch; Geo. A. Spear, builder.

Cottage St., near Railroad Bridge, for Henry L. Batchelder, office, 17′ x 17′ 6″, one-st'y hip; John Horsfield, builder.

Buttonwood St., rear Mt. Vernon St., Ward 15, for Morris Welch, dwell., 21′ x 30′, one-st'y flat.

Saratoga St., No. 593, for Thomas Pounder, dwell., 19′ x 27′, one-st'y pitch; Wilbur Goodwin, builder.

Wadsworth St., near Milton St., Ward 1, for Ohable Shalon, et al., chapel and dwell., 24′ x 26′, two-st'y pitch.

Shawmut Ave., Ward 19, *Nos.* 781-783, for J. C. and F. A. Loud, 2 dwells., 19′ 6″ x 60′ 6″, three-st'y flat.

Monadnock St., near Dudley St., Ward 20, for Edwin H. Kieth, dwell., 22′ and 28′ 6″ x 20′ and 32′, two-st'y pitch; Duncanson & Marchbank, builders.

Mt. Bowdoin Summit, rear of, for Mary T. Mallon, stable, 42′ 8″ x 46′ 8″, two-st'y pitch; Geo. W. Woods, builder.

Commercial St., near South St., Ward 24, for Dexter J. Cutter, storage of coal, 50′ x 100′, one-st'y mansard; Malcolm McLeon, builder.

Ashmont St., cor. Unnamed St., Ward 24, for Timothy Dunn, 2 dwells., 15′ x 25′, two-st'y pitch; S. D. Ramsdell, builder.

M St., No. 3, Ward 14, for Wm. T. Eaton, dwell., 20′ x 44′, three-st'y flat; Wm. T. Eaton, builder.

West Third St., No. 65, Ward 13, for Wm. T. Eaton, dwell. and store, 20′ x 36′, three-st'y flat; Wm. T. Eaton, builder.

Gilbert St., near Centre St., Ward 23, for Owen Nawn, 2 dwells., 26′ x 37′, three-st'y flat; Stephen McNeil, builder.

Middle St., Nos. 71 *and* 73, Ward 15, for Michael Donovan, 2 dwells., 20′ x 28′, three-st'y flat; Clarence C. Snow, builder.

Park St., near Adams St., Ward 24, for Daniel Kelshea, dwell., 22′ x 30′, two-st'y flat; R. McCormick, builder.

Perkins St., rear of, Ward 23, for McDermott & Gormley, greenhouse, 30′ x 75′, one-st'y pitch; Reed & Ryan, builders.

Tudor St., No. 57, Ward 15, for Thomas W. Roulston, dwell., 22′ x 42′, three-st'y flat; Thomas W. Roulston, builder.

Brooklyn.

Building Permits. — *Elm St.*, s s, 235′ w Bushwick Ave., 2 two-st'y frame dwells., tin roofs; cost, each, $2,800; owner and builder, Henry Stocks, 1437 Broadway; architect, J. Herr.

Nassau Ave., n s, 60′ e Eckford St., 2 three-st'y frame tenements, gravel roofs; cost, total, $8,500; owner, Edward Preston, Leonard St.; architect, P. J. Tilson; builders, J. & J. Van Riper and S. W. Randall.

Herkimer St., n s, 248′ 9″ e Bedford Ave., 3 three-st'y brownstone front dwells., tin roofs; cost, each, $8,500; owner, M. E. Stafford, 835 Dean St.; architect and builder, John Stafford.

Grand St., n s, 200′ w Ewen St., 3 three-st'y brick stores and dwells., tin roofs; cost, each, $7,000; owner, Coleman Estate, 171 Bedford Ave. and 206 Washington Ave.; architect, E. F. Gaylor; builders, S. J. Burrows and S. L. Hough.

Gates Ave., s s, 63′ 4″ w Throop Ave., 2 three-st'y brownstone front stores and tenements, gravel roofs; cost, each, $3,500; owner and builder, L. E. Brown, 126 Herkimer St.; architect, C. E. Cozzens.

Vernon Ave., n s, 160′ w Tompkins Ave., 2 two-st'y brownstone front dwells., tin roofs; cost, each, $5,000; owner and builder, Jno. Cregier, 125 Vernon Ave.

Wolfe St., No. 116, s s, 320′ e Franklin St., three-st'y frame tenement, gravel roof; cost, $4,000; owner, architect and builder, C. H. Reynolds, 111 Noble St.

Leonard St., e s, 330′ s Nassau Ave., 3 three-st'y frame tenements, gravel roofs; cost, total, $9,000; owner, Mrs. Thos. Denman, Eckford St.; architect, F. Weber; builders, J. & J. Van Riper and S. W. Randall.

Ten Eyck St., No. 203, three-st'y frame double tenement, tin roof; cost, $4,000; owner, Catharine Scherer, 205 Ten Eyck St.; architect, J. Platte; builders, J. Schleret and F. J. Berlenbach.

Block bounded by Marcy and Harrison Aves., Lynch and Hayward Sts., three-st'y in front and one-st'y in rear, brick armory for Forty-seventh Regiment; cost, $96,000; owner, State of New York; architect, W. A. Mundell; builders, Jas. Rodwell & I. B. Jacobs.

Fourth St., n s, 150′ w Sixth Ave., 3 two-st'y brownstone front dwells., tin roofs; cost, each, $5,000; owner and builder, Patrick Mullady, 576 Quincy St.; architects, Parfitt Bros.; mason, Philip Sullivan.

North Eighth St., n s, 80′ e Third St., four-st'y brick tenement, tin roof, iron cornice; cost, $6,600; owner, Frederick Rau, Third St.; architect, A. Herbert; builder not selected.

Paige Ave., n w cor. Oakland St., one-st'y frame open shed; cost, $4,000; owner, Edward Smith, 131 Noble St.; architect and builder, S. F. Bartlett.

Alteration. — *South Eighth St., No.* 134, part of building raised three stories and part raised one-st'y, tin roof, etc.; cost, $8,000; owner, Jos. Heiser, Rockaway Beach; architect, J. Platte; builders, J. McQuade and Jenkins & Gillies.

Chicago.

Houses. — Cobb & Frost, architects, have plans ready for the following: —

House on the North Side, for Mr. R. W. Tansill, of greenstone, rough-hammered, slate roof.

Dwelling-houses on Bellevue Pl., for Mr. Potter Palmer, each 23′ x 90′, three-st'y brownstone.

House for Mrs. Turner, adjoining above, to be 30′ x 90′, of blue Bedford stone.

Dwell. for Mrs. Rothschild, on Michigan Ave., 25′ x 65′, three-st'y, pressed-brick and brownstone.

W. L. Carroll has completed plans for sixteen houses for Mr. R. T. Crane, Chicago pressed-brick, cut-stone trimmings.

Plans by same architect for three-st'y stone front house for L. T. Law, at 591 West Monroe St.

Burnham & Root, architects, have plans ready for house on Prairie Ave., for Mr. T. R. Birch, two-st'y brownstone.

Same architects will build house on North State St., two-st'y, for Mr. J. W. Brooks.

Mr. J. M. Van Osdel, architect, planned residence to be built on cor. of Adams and Leavitt Sts., for Mr. B. L. Crumb, two-st'y brownstone front; cost, $7,000.

Depot. — Burnham & Root are building a depot for the Chicago, Burlington & Quincy Railroad, at Galesburg, pressed-brick and stone, slate roof, 100′ x 250′.

Church. — C. Chapman, architect, has prepared plans for a church for the Methodist Episcopal Society, cor. of Twenty-eighth St. and Portland Ave., 46′ x 74′, to be of Chicago pressed-brick, stone finish, two stories high.

Flats. — J. M. Van Osdel, architect, has drawings ready for flats on West Monroe St., for Mr. E. H. Gammon, three stories and basement, Bedford stone front; cost, $10,000.

Building Permits. — Stegman & Spory, two-st'y dwell., 21′ x 56′, 3440 Dearborn St.; cost, $3,000.

Louis Link, three-st'y basement store and flats, 25′ x 75′, 581 Blue Island Ave.; cost, $8,000.

J. Wittans, three-st'y basement stores and flats, 24′ x 104′, 607 Throop St.; cost, $11,000.

John Eger & Co., two-st'y brick factory, 35′ x 85′, 375-377 Illinois St.; cost, $3,000.

Theo. Dyckman, three-st'y basement store and flats, 25′ x 59′, Twenty-sixth St.; cost, $6,000.

D. Delaney, three-st'y flats, 22′ x 64′, 3603 Daspiel St.; cost, $4,000.

Thos. L. Gomier, 9 one-st'y stores, 32′ x 297′, Throop St., cor. Madison St.; cost, $20,000.

M. M. Rothchild, 3 two-st'y basement and attic dwells., 50′ x 65′, 3203 Indiana Ave.; cost, $15,000.

A. B. Johnson, four-st'y basement brick warehouse, 42′ x 120′, 551-555 Green St.; cost, $12,000.

M. Hagerty, two-st'y dwell., 24′ x 46′, 198 Polk St.; cost, $3,500.

Western Refrigerator Co., six-st'y brick refrigerator, 50′ x 100′, 231-233 Michigan St.; cost, $30,000.

J. Bauer, two-st'y dwell., 24′ x 63′, 401 Indiana St.; cost, $3,500.

Chas. Heineman, two-st'y basement dwell., 23′ x 61′; cost, $5,000.

John Downey, three-st'y dwell., 24′ x 108′, No. 322 Harrison St.; cost, $11,000.

M. Morrison, two-st'y and basement dwell., 21′ x 50′, 841 Twenty-second St.; cost, $4,000; architect, G. Zucker; builder, W. Horack.

Geo. Auer, two-st'y and basement dwell., 23′ x 48′, 146 Johnson St.; cost, $3,500; architect, A. Bessler; builder, E. C. Chapper.

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CONTENTS.

THE investigation into the affairs of the Government Architect still continues, although the evidence brought forward has not done much, we imagine, to bring conviction to the minds of the committee of investigation. Perhaps it is not unfair to say that the inquiry assumes more and more the air of a proceeding instigated and sustained by unsuccessful competitors for public work, and as such it has an interest for other architects, who, as most of them know, sometimes suffer severely from the vindictiveness of disappointed contractors. As is not unnatural, the prosecution in the present case takes pains, wherever it may be possible, to give special prominence to the fact that certain contractors who have done a good deal of work for the Government were not the lowest bidders for the work, evidently expecting in this way to impress the minds of the jury, or the public, with the idea that an unfair, if not a corrupt discrimination was exercised against some honest citizen who was ready and willing to do the same work at a smaller price; and thus to arouse their resentment at official injustice, as well as at unnecessary waste of the public money.

THAT the indignation of the public, if a plausible case should be made out in regard to these two points, would be serious, seems to be better understood by the prosecution than the defence, and there has as yet been little or no attempt to give satisfactory reasons for exercising in the public business such preferences as even a private architect sometimes finds it difficult to justify to a client who has perfect confidence in him. Certain circumstances, such as the general reputation of a contractor, previous experience of his work, or the knowledge that he possesses some special facilities for carrying out his agreement in a satisfactory manner, often have a much greater importance in the eyes of the architect than in those of his employer, and although the estimate of the professional man is generally the correct one, he often finds himself reduced to serious straits to defend it. If, then, an architect in private business finds it sometimes so hard to convince his clients of his intelligent devotion to their interests, it is likely to be all the harder for one in an official station to prove the sincerity of his acts before judges incapable of appreciating circumstances which seem to him all-important; and as it would be a misfortune for the whole profession to have a false construction placed upon the exercise of a discretion which is essential to the usefulness of its members, we hope that the defence in the present case will see that in this respect no doubt whatever is left in regard to the propriety of the awards.

THE people of St. Paul, Minnesota, have done an excellent thing in petitioning the city Government to appoint as Inspector of Buildings, under their new law, a well-trained engineer, who has practised his profession in and about the town for some time. Although the chief inspectors who control building operations in our large cities have, as a rule, shown great ability and discretion in directing practical work, they have not generally been furnished with the theoretical knowledge which would enable them to judge accurately concerning novel constructions, and their influence has in consequence been rather adverse to real progress in the art of building. Every one who is familiar with municipal building laws knows that their requirements in regard to the thickness of walls, for instance, not only fail to provide for anything beyond ordinary contingencies, but treat these with a certain generalization which, although suited to a limited discrimination on the part of those who are to carry them out, is not adapted to promote economy in the cost of construction, and leads practically to the expenditure, every year, of an immense amount of money on bricks and mortar which simply encumber the building containing them, without adding anything to its stability or strength. Such cases as these can be better dealt with by an engineer, who can easily see the course of the strains in a design, than by a practical builder, who, unless of very exceptional character, is likely to be rather afraid of any departure from the ordinary routine, and to require an unnecessary margin of safety.

A LITTLE difficulty has been found in carrying out the praiseworthy scheme for the improvement of the territory bordering upon the Falls of Niagara, in the shape of an unexpected demand of one of the State Departments for payment for work which every one expected to have done for nothing. The law establishing the Commission in charge of the new park provided that before any steps were taken for acquiring title to the land near the Falls a map should be made of the territory "by the State Engineer and Surveyor;" and in accordance with the authority which they imagined to be conveyed by these expressions, the Commissioners requested the State Engineer to make the map referred to, giving him at the same time a detailed list of the various tracts which they had decided to take for the public use. The answer to this communication was a request from the State Engineer to be informed whether the Commissioners were prepared to pay the necessary expenses connected with the preparation of the proposed map; and a second letter informed them that the cost would be about three thousand dollars. This intelligence was rendered the more surprising by the fact that the State Engineer's office, although sustained by a liberal annual appropriation, is said to perform little or no public service, and the preparation of the map would not involve the employment of any assistance outside of the office; while, even if it had been necessary to engage outside help, the entire cost of the map is estimated by other engineers as being properly only about three hundred, instead of three thousand dollars. As the Commissioners had no funds for paying the State Engineer's bills, and could go no farther without a map, it seemed at first necessary to suspend operations, perhaps until the next meeting of the Legislature, but some United States engineer officers have come to their aid, and have promised them a copy of their own map, which will undoubtedly serve their present purpose.

ANOTHER suit has been begun against the New York elevated railway companies, to recover damages for injury to the health, business and property of two physicians, who have occupied for eleven years the houses on the corner of Sixth Avenue and Fifty-third Street, using them partly for residence, and partly as a hospital, where some of their patients are kept. Five years ago the elevated railway was constructed around two sides of their estate, the track being about on a level with their third-story windows, and passing within a few inches of the corner of the building, and since then they and their patients have been greatly annoyed by the whistling, rumbling and hissing of trains, as well as by the sparks, cinders, gas, steam and smoke from the locomotives, and the obstruction of light and air, and convenient locomotion through the street. The plaintiffs set the value of the injury done them at the moderate sum of twenty-five thousand dollars. The answer of the railway company is the familiar one, denying any nuisance or trespass, and asserting that the road was built with great skill, and does not obstruct any light or air. It claims also that streets are not intended for light or air, but for passage, and that if owners of abutting property want light and air, they can get them in some other way, and insists further

that in any case the streets are the property of the Mayor, Aldermen and commonalty of the city of New York, who gave the company the right to build a railroad through them, and are responsible for all the consequences. One is a little surprised that some one of the counsel for the company does not emulate the example of the New Jersey paper manufacturer, who poured carbolic acid into the drinking supply of Jersey City, and claim that the roar and smoke of trains is beneficial to invalids in the neighboring houses, but that argument may be held in reserve. It will probably be many months before the case is decided, if it should not be compromised; but we shall be curious to learn what the courts will say to the doctrine that streets are not meant to supply light and air.

A STORY is going the rounds of the papers, to the effect that a number of capitalists in New York propose to erect a Crystal Palace, after the model of that at Sydenham, in the suburbs of New York or Brooklyn, where a permanent exhibition will be held. It is said to have been already decided that the structure, or rather, group of structures, shall include a machinery hall, an agricultural building, a horticultural building, and a hall of arts and sciences. A company has been formed for the purpose of carrying out this interesting undertaking, and stock will be issued to the amount of five million dollars, on which it is "confidently expected" that annual dividends of ten per cent will be paid. After the experience of the public with the Keely Motor Company, we can readily understand that stock in some such scheme as that described may sooner or later be put upon the market; but to believe that buildings of anything like the proposed size and cost will ever be erected in or about New York or Brooklyn for the proposed purpose, or that, if they should be, they would ever pay interest on the capital invested in them, requires a faith too great for our powers. To say nothing of the fact that the malarious character of all, or nearly all, the open spaces around New York and Brooklyn would reduce the attendance at evening entertainments, upon which the Sydenham Palace relies for much of its income, to the smallest limits, it might as well be remembered that the Sydenham Palace itself, which, instead of being built new by its present owners, was bought at second-hand for a mere song, has not, even under most excellent management, and with a great variety of attractions, earned enough to pay for the repairs necessary to keep the rain out of it, to say nothing of any dividends to stockholders.

ANOTHER of those schemes for supporting temporarily a few sharpers at the expense of simple people has been introduced in the central part of the United States, which is generally supposed to be the most favorable field for such enterprises. According to the descriptions in the newspapers, which give it an amount of free advertising which does no great credit to their penetration, the new project has in view the construction of two double-track narrow-gauge railways, one extending from New York to San Francisco, and the other from Chicago to New Orleans. As there are already several other railroads connecting these points, none of which, even with the help of the local traffic secured by touching at all the inhabited points on the way, can do much more than pay expenses, it is difficult to understand the necessity for building more lines at present; but the explanation is probably to be found in the fact that the new ones are to be "The People's Railroads," those already in operation being, we presume, the monopolists' railroads, or something else objectionable of that sort. The cost of the People's Railroads is to be three hundred million dollars, and this modest sum is to be raised by popular subscription. In order that "every poor man in the country" may become a stockholder in so beneficent an enterprise, the price of shares is fixed at five dollars, which, as may be perceived by dividing this into the capital, will not only afford all the poor men a chance of subscribing, but will leave a considerable surplus of shares for the rich men. In fact, the promoters of the scheme seem to have thought it prudent to interest some of the rich men first, for, with an inconsistency which should, no doubt, be attributed to their zeal in so good a cause, it was announced, at a recent meeting in Indianapolis, that the State of Indiana would be allowed only one hundred subscribers, of which seventy-five might be residents of Indianapolis. This, unless an unfair discrimination is to be made against Indiana as compared with other States, would indicate that the subscribers there are expected to hold at least one hundred thousand dollars' worth of stock apiece, and that the people of Indianapolis require restraint to prevent them from contributing more than seven millions and a half toward the road. All the employés of the company are required to be stockholders, but whether of the hundred-thousand or the five-dollar variety is not stated; and in order to give the affair more attractiveness in the eyes of silly people, it is announced as having "somewhat the character of a mutual benefit association." We should like to see the balance-sheet of a mutual benefit railroad after a few years of existence. It is sad to think that unless some unwary step should serve to bring them within the reach of the law, the originators of this pretended scheme are likely to succeed, with the aid of the newspapers, in making many dupes.

EVERY one may not know that the asbestos mineral which is now brought from Canada, and manufactured into a variety of articles of daily use, is a very different substance from the ancient asbestos, or amianthus, which has been extracted in small quantities for twenty centuries from certain mines in Italy. The Italian asbestos, as well as a similar substance found in the Tyrol, is a double silicate of lime and magnesia, containing also protoxides of iron and manganese, with fluorine, and a trace of water, and as found in the mines it consists of slender fibrous pieces, of a color something like that of green slate, occupying crevices and cavities in the rocks. The Canadian asbestos, on the contrary, occurs in large stratified masses, of a pinkish color, fragments of which are readily crushed into a mass of silky filaments, ready for spinning or matting into felt. The composition of the Canadian stone is as different from that of its ancient prototype as its appearance. Strictly speaking, it is not asbestos at all, but a variety of serpentine known to mineralogists as chrysolite, and instead of being a double silicate of lime and magnesia, it contains silica and magnesia alone, joined, however, unlike the Italian asbestos, with a large proportion of water, amounting to nearly one-third of its bulk.

AT a recent meeting of the Parisian Society of the graduates of the Ecole Centrale, M. de Lesseps, who was present by invitation, delivered an address containing interesting references to the great works in which he is now, or has been engaged. In regard to the second Suez Canal, about which his audience naturally showed some curiosity, M. de Lesseps said little, preferring not to anticipate the report which he was to present at the meeting of the stockholders which was soon to occur; but he assured his hearers that the design for a parallel canal, to be constructed when the first one should become inadequate to the demands of commerce, had always formed part of his project, although he was perhaps the only person who foresaw from the first that it would soon be necessary. The widening of the present canal, in place of excavating a second, would, in M. de Lesseps' opinion, which certainly seems well founded, be injudicious. The meeting of vessels, even in a widened canal, at other points than in the turn-outs provided for the purpose, would be a fruitful source of accidents and losses, all of which would be avoided by keeping, as he proposed, the routes for northward and southward passage entirely distinct.

ABOUT his latest, and most romantic scheme, that for inundating the great African desert, M. de Lesseps spoke more at length. It seems that further surveys have been made of the territory to be flooded, which confirm the approximate levels previously taken; and Captain Roudaire now announces the readiness of himself and his friends to undertake the work, without any subvention, guaranty of interest, or other pecuniary aid whatever from the public purse, asking only to be allowed the use for ninety-nine years of such lands bordering the canal and the new lakes as would without them be entirely sterile. At the end of the term, the whole territory, with the canal and other property, would revert to the Government; and as M. de Lesseps sarcastically observed, even supposing that the predictions of the opponents of the scheme should be realized, and the inland sea become a mass of salt, the Government would at least be put at the end of the lease into possession of an immense quantity of a substance which passes for money in the interior of Africa, and could be quarried and sold at a great profit.

WATER-CLOSETS.[1] — XIV.

THE Hartford Glass Closet. — The glass closet which has been recently introduced into the market was invented in this country by M. Hogan in 1878, and he also received patents for improvements in the year 1882. In addition to the novelty in the form of the overflow, which is intended to take place through an opening in the plunger, this closet is provided with a lining or inner shell composed of glass, on the supposition that glass will not have the small net-work of cracks which cover the glazed surface of most earthenware. These small cracks, the "craze," in earthenware serve as a nucleus around which filth and sediment collect. Of course glass can be used as readily in this connection with a valve or hopper closet as with the one under consideration, and to their advantage, if the claim made of the non-collection of sediment can be sustained. The plunger in this closet has an overflow through perforations on top of the plug into a water-seal trap situated in the bottom of the plunger. The overflow also has a mechanical valve as an additional seal against sewer-air. The valve is so arranged that the water flowing from the bowl of the closet would raise it from its seat, while it would drop into its place again as soon as the pressure of the water should be removed. The water-seal trap is arranged either as shown in the illustration or in the form of a simple U-trap, with the mechanical valve on the top of the short arm of the trap. The siphon trap under the closet has a flap-valve and inspection-cover bolted on near its crown, the flap-valve being intended to form a fourth intervention between the soil-pipe and closet-bowl.

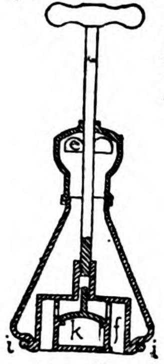

Fig. 140.

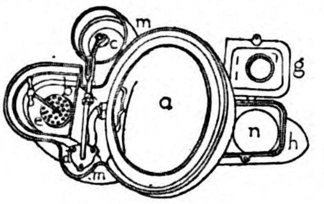

Fig. 141.

Hartford Glass Closet.

a, Bowl. *b*, Plunger-chamber. *c*, Float. *d*, Valve for supply.
e, Top of plunger, showing perforations for overflow. *m*, Iron casing.
g, Inspection-opening. *h*, Trap. *n*, Flap-valve. *f*, Overflow.
k, Mechanical valve. *i*, India-rubber ring.

Among other closets belonging properly to this class and type, in which the plunger is different from the ones previously described, I find one invented by Blunt in 1876, one by W. Turton, 1878, one each by Keith and Blesch in 1882. These closets all received patents from the United States.

The Blunt Plunger. — The Blunt plunger consists of one cylinder, closed at the top, slipped over one of a smaller diameter, which is open at both ends. When the two cylinders are joined together there is a passageway for the water through the space formed by the difference in their diameters, the outside cylinder being closed at the top and open at the bottom, while the inside cylinder is open both at the top and the bottom. The water which stands in the space between the two cylinders forms a water-seal equal to the height of the inside cylinder. This plunger has a rubber flange fastened to the bottom of the plunger by screw-bolts.

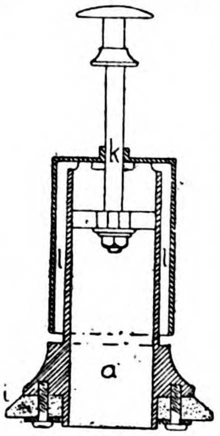

Fig. 142. — Blunt's Plunger.

a, Small cylinder.
l, Space between cylinders.
i, India-rubber flange.
k, Hand-pull.

The Keith Plunger. — Keith's plunger consists of a cup or bell fitted into a receptacle made for the purpose on the top of the plunger. The water-seal trap is formed on the same principle as that of the bell-trap in such common use for area cesspools. The seal in the trap is slight and would be easily destroyed by evaporation.

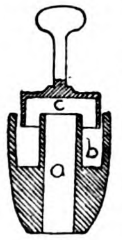

Fig. 143.

Keith's Plunger.

a, Overflow.
b, Trap.
c, Bell.

The Blesch Plunger. — Blesch's plunger is arranged with a supply-pipe running down into the centre of it. In this manner the centre of the plunger, which is hollow, is filled with water when the plunger is lifted from its seat. The water can only escape through small holes left for the purpose, and consequently the plunger takes its seat gradually. The illustration shows the plunger raised to its highest point.

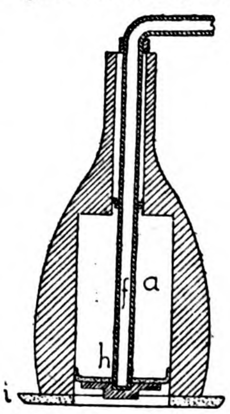

Fig. 144. — Blesch's Plunger.

a, Hollow in centre of plunger.
f, Supply-pipe.
h, Piston on supply-pipe.
i, India-rubber bottom.

SOLID-PLUNGER CLOSETS.

Closets of this type cannot claim a novelty on the distinctive feature of the class, as the solid plunger is old, unless it be for the shape, position, or manner of lifting. The first closet of this type and class, and also the first plunger-closet for which a patent was issued, was invented in this country by Henry & Campbells in 1857, being one year earlier than the invention of Jennings in England.

Henry & Campbells's Closet. — There was nothing new in either the tank, which was placed under the seat, or in the plunger, which was solid, when this closet was patented. This closet, as will be seen by the illustration, contains a large amount of water for scouring the soil-pipe. When the plunger is lifted from its seat, the contents of the tank, plunger-chamber and bowl would be emptied into the soil-pipe. The interest in this closet consists in its being the first of the class patented.

Henry & Campbells's Closet.

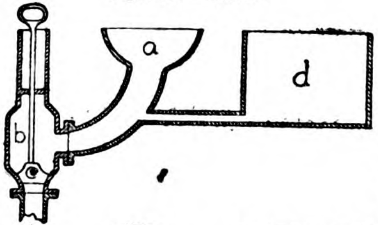

Fig. 145. — Section.

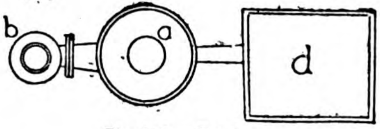

Fig. 146. — Top View.

a, Bowl. *b*, Plunger-chamber. *c*, Plunger.
d, Tank.

Conron's Closet. — The United States in 1868 granted patents to G. Conron for a solid-plunger closet. In this closet the bowl is conical, while the outlet is at the bottom; thence it passes through a horizontal pipe about eighteen inches long, at the end of which is situated the plunger-chamber. Between this chamber and the bowl is a branch pipe, which serves as a conduit for water into the float-chamber that contains the float governing the supply-valve. The overflow opens near the top of the plunger-chamber, and connects with the soil-pipe below the seat of the plunger, this part of the closet being a solid sphere joined directly to the hand-pull by a simple rod. J. J. Frey improved this closet by adding a flushing-rim.

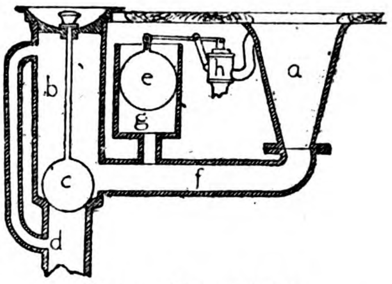

Fig. 147. — Conron's Closet.

a, Bowl. *b*, Plunger-chamber. *c*, Plunger.
d, Overflow. *e*, Float for supply-valve.
f, Horizontal connecting-pipe.
g, Float-chamber. *h*, Supply-valve.

Ingleton's Closet.—In 1869 a closet belonging to this type was invented in England by James Ingleton. This closet is a good example of the form with a solid plunger. The plunger and float compartments are separate from the bowl and each other, being only connected by short pieces of pipe. What is gained by having these compartments only large enough for the plunger and float to move in them is more than counterbalanced by the disadvantage of the pieces of pipe connecting the bowl with the two chambers. Such are always to be avoided on account of the difficulty in keeping them clean. The overflow is from the top of the float-chamber through a siphon-trap, and empties into the soil-pipe just below the seat of the plunger. The overflow is kept full of water by a driblet. The top part of the plug of the plunger is made of cast-iron, being intended to act as a weight and keep the plunger in place, while the bottom is a slightly conical piece of vulcanized india-rubber, the part that fits into the seat being in the form of a projecting lip, so as to be flexible.

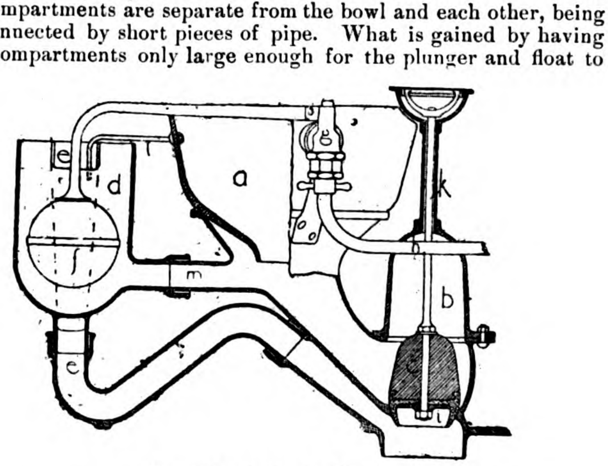

Fig. 148 — Ingleton's Closet.

a, Bowl. *b*, Plunger-chamber. *c*, Cast-iron block on bottom of plunger.
i, India-rubber bottom. *d*, Float-chamber. *e*, Overflow. *f*, Float.
g, Supply-valve. *h*, Supply-pipe. *k*, Rod for hand-pull.
l, Driblet to fill trap of overflow. *m*, Connection between bowl and float-chamber.

Pearson's "Twin-Basin" Closet. — The "Twin-Basin Closet," invented in England by Pearson, in 1874, appears to have been extensively used in that country, and also to have had a limited sale in this country. This closet was divided into two compartments of almost equal dimensions, one for the bowl, the other for the ball-cock-float and plunger. This closet when first introduced was without an overflow, but the manufacturers found it necessary to supply the closet with an overflow which is taken from the top of the plunger-chamber and is sealed by water before it enters the soil-pipe below the plunger. The ball-cock is not as delicate as the hydrostatic diaphragm valve; it does not require the nice adjustment, and is less liable to get out of order. This closet with the overflow is illustrated in the articles on "Modern Plumbing" (see *American Architect* for September 14, 1878).

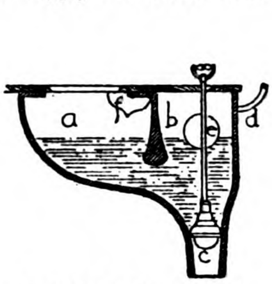

Fig. 149. — Section of Closet.

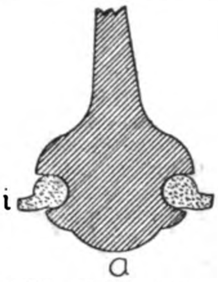

Fig. 150. — Section of Plunger.

Pearson's Closet.

a, Bowl. *b*, Plunger-chamber. *c*, Plunger. *d*, Supply-pipe.
e, Float for valve-cock. *i*, Rubber band around plunger.

Zane's Closet. — The "Sanitary" Closet is manufactured by Joseph Zane & Co., of Boston. The bowl, of porcelain, is attached to the plunger-chamber, which is of zinc-coated (galvanized) or enamelled iron, by means of clamp-screws. The supply-valve is a ball-cock designed specially for this closet. The plunger is solid and has a rubber ring around the bottom. The overflow is through a balanced pan or saucer that will tilt when it has received a certain amount of water, thus allowing any excess of water to pass through it. There is a small driblet from the supply-valve, placed so as to drip into the pan of the overflow. The plunger-chamber and the bowl connecting with the plunger-chamber have large openings to which vent-pipes, which are inserted into a heated flue, are to be connected. These vent-pipes are intended to cause a current of air, created by the heat in the flue, to pass from the room through the two compartments of the closet, thence into and up the flue, taking with it any offensive or injurious gases, left by the actual passage of fæcal matter, or arising from the sediment that adheres to the sides of the plunger-compartment. This closet takes a large amount of water when used, but the simplicity of the mechanism, the enamelled plunger-chamber and vent-pipes, make it one of the best of its class in the market. This closet should be supplied with a siphon-trap, properly vented. It is furnished with a straight outlet and an offset that is intended to be joined directly to the soil-pipe. It can only receive its supply through a valve, and has no flushing-rim of consequence.

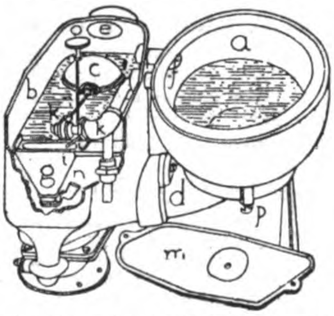

Fig. 151. — Zane's "Sanitary Closet."

a, Bowl. *b*, Plunger-chamber. *c*, Float. *d*, Connection between plunger-chamber and bowl. *f*, *e*, Vent. *g*, Overflow. *h*, Balanced pan. *i*, Driblet. *k*, Supply. *m*, Cover. *o*, Hand-pull. *p*, Clamp-screw.

THE LAST OF A NOTED CASE.[1]

IN January, 1879, Seth L. Phelps, then President of the Board of Commissioners for the District of Columbia, employed Thomas L. Plowman, an architect, to erect three dwelling-houses in the city of Washington. Associated with Plowman, though nominally in his employ, was George R. Tolman, between whom and Phelps, during Plowman's life-time, were no direct relations.

In April following, Plowman somewhat suddenly died, leaving the plans, etc., for the houses only partially prepared, and but one of the houses actually in course of erection. Thereupon Phelps employed Tolman to continue the work to completion.

Upon what terms Tolman was employed was the chief question in the controversy that subsequently ensued, and presently to be noticed. At any rate, the work proceeded, Plowman's plans being first altered, and then wholly abandoned: new and entirely different plans being prepared by Tolman, and the uncommenced buildings being laid out and proceeded with according to them — all with the full knowledge and assent of Phelps; and the relations of the parties were entirely harmonious until the second day of June following.

On that day, Tolman, having occasion to ask a payment on account, sent Phelps a note containing a request to that effect; in response to which the latter sent another note, by the same messenger, enclosing his check for but half the amount asked, and claiming the sum thus sent to be the amount due in full to date. This check Tolman at once returned by his messenger, assuring Phelps that there was some misunderstanding in the premises and inviting him to an interview, in order to correct such misunderstanding before further progress in their relations.

Phelps did not reply to this last note, nor did he seek the invited interview until the following morning, June 3. But on the same evening, that of June 2, he sent for another architect, who at once responded to the call that evening. In the interview that ensued Phelps stated that he had "done with Mr. Tolman," and asked his visitor to take the work. That gentleman, discovering that some difference had occurred between Phelps and Tolman, promptly protested that he could not enter upon the work on the latter's plans, because "plans, as instruments of service, are always the property of the architect;" but he promised to serve Phelps in the premises whenever a settlement with Tolman should have been effected. Phelps scouted the notion of the architect's ownership of plans, but the interview ended with an understanding that he would settle with, or, as events prove him to have intended, "settle," Tolman.

Thereupon, on the following morning, June 3, Phelps, with one of his employés, waited on Tolman at his office and opened the interview with a peremptory demand for "his [my] plans." He was told that the plans were not his, but those of the architect; and the usage to that effect, already brought to his notice the evening before, was again stated and explained to him: Tolman in addition stating that he, Phelps, could not have even the use of the plans until a settlement had been effected, Phelps then being in his debt. Further colloquy ensued, Phelps repeating his demand; and finally Tolman, expressing regret at the misunderstanding, offered to leave the whole matter to arbitrators, to be named by Phelps, and himself to retire and give up the plans on receiving whatever sum such arbitrators might award him in the premises. This offer Phelps at once declined, saying that Tolman must take what he, Phelps, would give or nothing. He thereupon left, declaring that he would "take steps to get the plans."

This interview developed that, while Tolman had uniformly understood Phelps to have employed him on the same terms as those on which Plowman had been engaged — that is, as an architect, to do an architect's work and receive an architect's compensation — Phelps, on the other hand, claimed Tolman to be merely a draughtsman in his, Phelps's, employ, at a stated monthly salary. This claim Tolman at once pronounced to be not only wholly new to him but also absurdly preposterous, at the same time exhibiting to Phelps a list of expenditures by him, Tolman, necessary to the work, that would have made his actual personal receipts on the terms claimed by Phelps much less than his receipts while associated with Plowman. This was quite clear; for while with Plowman Tolman was free from many expenses which, when himself conducting the work, he had to bear; yet Phelps, in seeming soberness, claimed that Tolman, under the altered circumstances, agreed to go on for just the same sum as that received from Plowman.

In this connection, another significant fact is that Phelps himself signed at least one contract with a contractor, duly drawn up, with Tolman named in the body as architect of the building, and containing the usual provisions that the work and material should be to the satisfaction of "the architect," who should decide all disputes, etc. Against all this, and much more strongly corroborative testimony was opposed the single word of Phelps.

Later on this same day, June 3, Tolman was served at his office with a writ of replevin for the plans, sued out by Phelps. Although the greater number of the plans were then in the office, and the same employé of Phelps was sent with the officer to identify the plans, none were taken. By his employé Phelps had again sent the check originally enclosed in his note to Tolman of the day before; which being again offered Tolman, he, needing the amount, received, distinctly stating, however, that he accepted it as a payment on account only.

The replevin having failed, there followed a lull in the proceedings, so far at least as outward manifestations were concerned. The same employé of Phelps, calling on Tolman, asked for and received the only plans necessary for the immediate prosecution of the work — which single fact conclusively negatives the idea, advanced by Phelps, that Tolman was using his possession of the plans to extort from Phelps more than was due. From Phelps himself, however, nothing was heard until the 5th, two days later. On that day Tolman was served with a warrant, sworn out by Phelps, charging him with *embezzling* the plans, the product of his own labor and which had never been out of his control. It was thus made manifest that Phelps was seeking the aid of the criminal law to attain his own private ends, which civil process had failed to serve, the only difference being that in the civil proceedings he had sworn the value of the plans at $150, while in the criminal effort he swore the value of the same plans at $500. Tolman was at once arrested and imprisoned in the common cell of a station-house, where he remained several hours and must have remained all night without food or bed, but for his accidental success in getting word to counsel.

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[1] See *American Architect* for July 5, 1879, pp. 1 and 7; July 19, p. 17; January 1, 1881, p. 1; and January 28, 1882, p. 37.

The next day he was arraigned for trial, and his prosecutor being practically Governor of the District of Columbia, the judicial oddity who presides over the police-court expressed a somewhat violent determination to send the case at once to the Grand Jury — which meant six months or a year in jail or under bail. Being prevailed on, however, to hear something of the case before disposing of it, he subsequently determined that the circumstances did not establish a case of embezzlement and so discharged Tolman.

Shortly thereafter Tolman brought his action against Phelps for malicious prosecution, and the cause was tried at the current term of the Supreme Court of the District of Columbia, holding a Circuit Court. At the trial the facts and respective contentions of the parties as above set forth were established with some additions unimportant to the main consideration. But one fact, equally important and surprising, was developed, viz., that before procuring Tolman's arrest Phelps had obtained the advice of counsel favoring the contemplated outrage. This counsel stated at the trial that when advising Phelps he had heard only one side; that he had heard neither of Tolman's claim that he was working on commission as an architect, nor of his offer to submit to arbitration; none the less, however, he did know of Tolman's claim of ownership, as also of his claim to a lien for the unsettled balance due him. Under the circumstances, to have advised the prosecution is scarcely less — indeed more — amazing than to have conceived it.

All this, and every other, sort of defence to the action, however, was wholly neutralized by the perfectly blunt declaration of Phelps when on the stand: "My own impression," said he, "was that the prosecution would result in my obtaining the plans." Volumes could not speak more for the spirit underlying this prostitution of a public remedy to a private end.

Such was this case as submitted to the court and jury; nothing material to the main issue is here omitted, and nothing undeveloped at the trial is stated. The court seems to have made a noticeable effort — so much so as to excite remark — in the direction of shielding the defendant, and to have thrown against the victim of an unprovoked and gross outrage the weight of its too evident sympathy with his oppressor. The jury, however, returned a verdict for the plaintiff in the sum of $500, enough merely to vindicate Mr. Tolman, but a mere pittance in respect of administering a wholesome and much-needed lesson to his domineering and malicious antagonist.

We have been at some pains to procure a trustworthy and accurate report of this case, of such unusual interest to the architectural profession. In setting forth the result of such effort, we have sought merely to state the facts, leaving to our readers the comment that the bare recital suggests. Whether such a case could arise elsewhere than at Washington we may not presume to say; we may only, for the sake of the human character, hope not.

SALUBRITE PARISIENNE.

THE following paper on the sanitary condition of Paris by Dr. Marié-Davy, the Director of the Observatory of Montsouris, is an important contribution to sanitary literature: —

In visiting London a comparison occurred to us which must have struck other excursionists. It would appear that the two capitals preserve in their condition the impress of habits contracted in the great armies of the two nations.

In France each button of the soldier's tunic is bright; his gaiters and his shoes are irreproachably clean; but his shirt and his skin are often neglected. At sea, on the contrary, the clothing of the English sailor is often blackened with tar or soiled with oil, but the shirt and skin are clean. It is the same with the two cities. The street in Paris is well kept and is embellished with houses of which the exteriors are periodically washed: but the houses lack air and water in the interior and their odor is often offensive. In London the street is badly swept and badly washed: the attention is given to the interior of the house.

Let us preserve the cleanliness of our streets, but let us extend this cleanliness to our houses where our women and children live. With our houses this care is the more necessary because of their greater height and less complete ventilation.

We complain of the odors of the sewers of Paris; there is reason for this, and the question is asked: How would it be if we introduced therein also all of our human dejections? We forget, however, to consider that the most effective inlets are not those of the sewers which receive human dejections, but those in which there remain deposits due to the cleansing of the public streets.

Whether we discharge into our sewers all or none of the fresh water-closet matter, the odor at these inlets remains the same and is equally unacceptable. It must be overcome at whatever cost, and when it is overcome, which is a simple question of water, and of cleansing, we shall see that water-closet matter which has not begun to ferment may be delivered into the sewers entirely unperceived.

The badly smelling sewer inlet is like the badly kept gaiter button. How many Paris houses maintain with resignation a disgusting sewer opening on each story and in each suite of apartments, and a still more disgusting opening above each roof. We are told that the wind carries away and disseminates all of this. The wind when it blows carries into the well-kept house the emanations of the unclean one. When it is strong it purifies the atmosphere of the city; but how is it when it is light, and especially when the air is descending upon the city? Aside from this, even when there is a wind, we have provided for us in the outskirts of Paris foul-smelling manufacturing establishments.

The air breathed in Paris is filled with microscopic organisms. We are far from admitting that all of these organisms are injurious; we believe, on the contrary, that the greatest part of them serve as auxiliaries, after the manner of the dogs of Constantinople. However, it will be conceded that their greater or less abundance is in accordance with the degree of purity of the air that we breathe. Experiments have established this.

If we go from the outskirts toward the centre of Paris, M. P. Miquel, the skilful micrographist of the Observatory of Montsouris, finds the number of germs contained in equal volumes of air to be as follows:

In each cubic metre of air.	*Number of germs*
In the Park of Montsouris	51
In a room of the Observatory	325
In the Micrographic Laboratory	550
In the Rue de Rivoli	680
In a bedroom of the Rue de Monge	5260
In the Hospital de la Pitié (spring)	7730
In the Hospital de la Pitié (winter)	13280

If we descend from the higher atmospheric positions to the level of the ground we find a considerable and even more rapid increase.

In each cubic metre of air.	*Number of germs.*
Top of the Panthéon	28
Park of Montsouris	45
Mayoralty of the Fourth Arrondissement	468

At the top of the Panthéon the number of microbes found in a cubic metre of air changes with the direction of the wind, according to the extent of city area that it crosses before reaching the suburbs, and also according to the quarters over which it has passed.

Top of the Panthéon, by winds:

In each cubic metre of air.	*Number of germs.*
From the northeast	64
From the southeast	43
From the southwest	25
From the northwest	50

Similar results are found in examining the dust of rooms. Miquel found for each gramme of dust gathered.

In each cubic metre of air.	*Number of germs.*
At the Observatory of Montsouris	750,000
In a room in the Rue de Rennes	1,300,000
In a room in the Rue Monge	2,100,000

Inhabited places may find their number of germs augmented from year to year with no apparent external cause.

BACTERIA FOUND PER CUBIC METRE OF AIR.

	In the Micrographic Laboratory.	*In the Park of Montsouris.*
In 1880,	215	71
In 1881,	348	62
In 1882,	550	51

Furthermore, when the apartments of la Pitié, and without doubt also those of dwelling-houses, are aired by the opening of windows, the number of microbes contained in the air of the room is lowered suddenly, while that of the streets is augmented.

The experiments of M. Miquel show that dampness is one of the most effective causes in the reduction of the number of aerial germs, and the number of these germs found in sewers and in soil-pipes or the ventilation-pipes of vaults — a number which varies but little from one season to the other — is far from being in accordance with the ordinary opinion concerning the air of these conduits.

It has been suggested, therefore, that the emanations from these conduits, however unpleasant, are innoxious. Chemistry, however, has interposed its new discoveries; it has demonstrated that, among the products of vegetable fermentation, as of the fermentation of animal matter, there are formed volatile compounds, some of which, in very minute doses, have the same action as the most violent poisons. We breathe them ordinarily in such attenuated doses that the system accommodates itself to them as it does to arsenic and nicotine. This is true; but can their continued and prolonged action be disregarded in a city like Paris where noxious organisms are always present? We resist the action of these so long as we do not offer them a "*terrain de culture*" suited to their development. But the depressing effect of bad odors and of the poisons which may and often do accompany them, tend eventually to diminish our power of resistance.

As to the sewers, the question seems well defined. Wherever there are stagnant matters entering into fermentation, no matter what may be the origin of these matters, whether vegetable or animal, or whether they are formed of human excrement, there is always at least a disagreeable odor. The first duty, quite aside from any question of introducing excremental matter, is, therefore, to prevent stagnation and fermentation. It is this that is being undertaken

and it will be found successful. This result once obtained, the addition of fæcal matters before the beginning of fermentation will be of no effect.

But the principal enemy, to which we give too little thought, is in the houses themselves. It is there that fermentation is established; it is thence that it must be removed by copious washing. It is at this point above all that the English have concentrated the water which we lavish on the public streets. It is in the house, which we too greatly neglect, that we find the superiority of London over Paris. We are told that we lack water, while it abounds in London. This is a great error; we have proportionately more water than have the inhabitants of London, but we use it differently. Let us continue to use it in the streets, but it is absolutely necessary that it should be also delivered far and wide in the house. We must be clean without, but we must also be clean within.

AMERICAN COTTAGES.

FEW architectural terms seem to have more elasticity than the homely word "cottage," which now-a-days is made to embrace almost every variety of dwelling between the "slab" shanty of the railroad laborer, the cot dear to the hearts of lovers, and the "villa residence" (reportorial English) of the Newport "cottager," on which has been lavished a hundred thousand dollars, and which bristles with more features to the square foot than the purist can really approve of. The significant word in the title of this book [1] being thus elastic, we ought not to be unprepared to find that the publisher has taken full advantage of it, nor surprised to find cottages suited to purses of very diverse capacities, and appealing to tastes equally various. An inspection of the book shows that the merits of the designs and the power of their authors are sufficiently dissimilar to ensure that the sale of the book will not be confined to any one class.

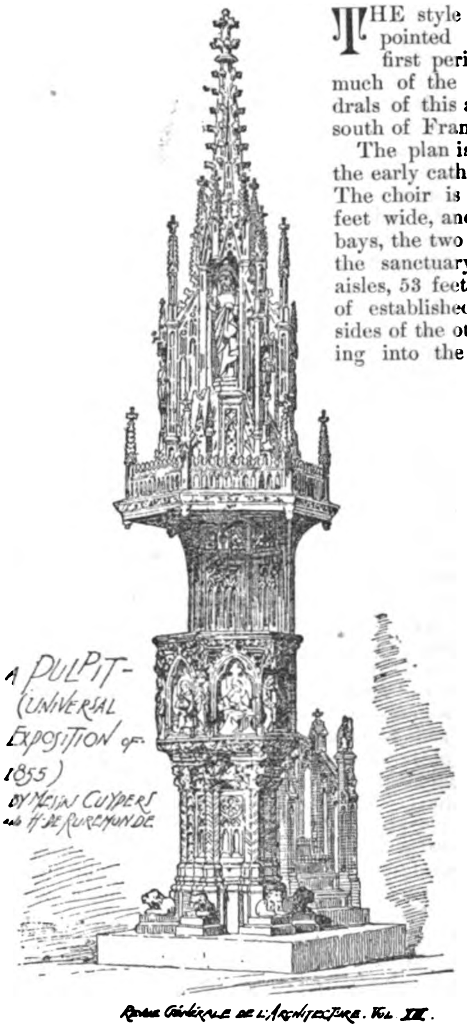
The book is a compilation of the designs of a dozen or more of the younger architects of New York and neighboring towns, some of which have evidently been carried into execution, and others as evidently have not — at least, we hope so — and is probably published to meet the public demand for ready-made architecture, — to provide a *vade mecum* which shall enable every man to be his own architect. Our personal experience shows there is a demand for such books, and we do not wonder that publishers attempt to meet it, although they do not always issue as satisfactory books as this, the good qualities of which are largely due to the designs being the handiwork of different authors. Such books as this, like the illustrations in our own journal, do absolute good to the profession at large, by showing the public how infinite are the ways of treating the same problem, and that even if the appropriation be small, it is not necessary that the building should be in carpenter's vernacular: still less when the appropriation is larger.

A good deal might be said in criticism of the several designs, both in the way of praise and of blame, but taken as a whole the work is a very satisfactory specimen of its class, though better suited to the needs of a would-be householder than to those of a professional. Yet if this is the intention of the book, it is strange that so little should be said of each design in the way of explanation of the materials and methods to be used in building it. Only one design is accompanied by a specification; of the others it is only said that they can be built for *about* such and such sums.

The attractive feature of the book is that the designs are published as their authors rendered them, and as the hands of some were more cunning than those of others their designs appear to better advantage. Thus the designs of Mr. Barlow and Messrs. Rossiter & Wright make more impression than any in the book, with two exceptions: one a design by Messrs. Kimball & Wisedell, for a very large stone house to be built in the Bermudas — a singular design to be found amongst American cottages — a peculiar combination, though striking withal, of Norman, Decorated and Tudor Gothic, with Saracenic and Moorish forms, and perhaps a little genuine American. The other exception is the block of houses built in New York for the Honorable John Kelly, which from every point of view is the most striking and the most atrocious thing in this collection, and we trust it cannot be equalled in any other. Unless its publication can be explained on political grounds, we are at a loss to account for it, and still less can we account for its appearance as one of the illustrations of a late issue of *Building:* if it were there inserted to advertise the book under consideration, it will probably do more harm than good. Another singularity is a "Row of Brick Dwellings, English style, American Plans." We confess we do not understand why such a title was selected, for if ever there was a design in vernacular American, this is one. Still another is the cottage designed by Mr. Janes, which embodies more architectural contortions for $4,000 than any but a confirmed jerry-builder could ever think of compassing.

THE ILLUSTRATIONS.

THE PROPOSED CATHEDRAL OF ALL SAINTS [SELECTED DESIGN,] ALBANY, N. Y. MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.



THE style adopted is Gothic or pointed architecture of the first period, worked out with much of the feeling of the cathedrals of this age in Spain and the south of France.

The plan is based upon that of the early cathedrals, a Latin cross. The choir is 91 feet long and 35 feet wide, and is planned in five bays, the two eastern bays forming the sanctuary. There are choir aisles, 53 feet long, 21 feet wide, of established proportions at the sides of the other three bays, opening into the choir by the main arcades, and to the transepts by arches corresponding.

The nave is 99 feet long and 40 feet wide, and has narrow side aisles its entire length. The greatest departure from ancient custom is here: the many attempts in modern times to use side aisles for actual accommodation of worshippers has always resulted in one of two evils; either many of the congregation have been placed behind piers and columns of the main arcades, so that the service has been out of their sight and hearing, or the piers and columns themselves have been pared and reduced to proportions artistically distressing, and almost dangerous structurally. Therefore the architect has arranged the side aisles to be used as passages only, and has widened the nave to the maximum, consistent with other considerations.

The transepts also show some originality of plan. They are 110 feet in complete breadth from north to south (including crossing) and 40 feet wide, forming a square crossing with the nave. Side aisles have been introduced to the west only, opening with one large arch, much as if the ancient arrangement of Eastern chapels were reversed, and by this arch being nearer to the crossing than to the end, the pillars are thrown out of the line of vision of any of the congregation.

The crossing has four great arches, corresponding with those of the nave and transepts, and above them breaks, by pendentives, into an octagon, in the manner frequent in the early Gothic cathedrals. The proportions and method of the octagon lantern and its ceiling are, however, designed to avoid excessive internal height and consequent acoustic difficulties.

An ambulatory continues the passageway of the side aisles all around the sanctuary, and affords an egress from the cathedral to the cloister.

A crypt is shown beneath the whole of the main structure.

The choir, nave and transepts with their side aisles are designed to be vaulted in stone with quadripartite groined vaults. The octagon of the crossing is to be (for the sake of lightening the load upon the foundations, and for acoustic reasons,) covered with a ceiling of wood. These stone vaults would not be in any way unprecedented or experimental, although they are of large size (40 feet wide). The vault of the great hall of the New Courts of Justice at London is 48 feet. That of Gerova Cathedral is 73 feet, and with its centuries of age, is true and firm, and Canterbury, York, Paris, Bourges and several other cathedrals are more than 40 feet clear between piers. The outer roofs of copper are to be carried by trusses of iron resting upon the main walls and buttresses.

The heights of the interior (from floor of nave) are as follows:

To springing of arches of nave and transept vaults, 48 feet; to underside of bosses, 70 feet; to centre boss of lantern over crossing, 113 feet; to springing of arches of choir vaults, 45 feet; to underside of bosses, 66 feet.

There is no tracery to the sides of nave nor in the nave aisle windows, little in the transepts, but more in the choir, and generally the choir has been given a richer character than the nave; leading up to the great traceried window in the square east end of the sanctuary.

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[1] *American Cottages.* Consisting of 44 large quarto plates, containing original designs of medium and low-cost cottages, seaside and country houses; also a club-house, pavilion, school-house, and a small seaside chapel, together with a form of specification for cottages. All in the latest prevailing styles, from the drawings of a number of prominent architects, thus securing a great variety of plans and diversity of treatment, and offering the largest opportunity for selection. New York: William T. Comstock, 1883. Price, $5.00.

The western end of nave has a rich circular window of radiating tracery, giving the required balance or rather echo to the eastern part and connecting the whole. The interior generally will be of fine cut stone of a warm, but not very dark red.

There are three steps up to the choir floor and three more to the sanctuary where the altar is raised upon a third group of three steps, in all about 5 feet above the floor of nave; this is sufficient to bring it properly in view.

A rood-screen of wrought-iron and brass is designed to separate the choir from the crossing.

The Bishop's throne and choir stalls are to be of cherry or oak carved and moulded. The pulpit is to be of fine stone or marble of a character similar to the already existing baptismal font. The organ is put over the first bay of the north aisle of choir with large arched front to the choir and another to the transept. The north side aisles of choir are proposed to be reserved for the pupils of St. Agnes School.

At the northeast angle are arranged the chapter-house, a lengthened octagon in form, a large clergy vestry communicating, so as to allow of their being used conjunctively; a choir vestry and a meeting hall are also arranged for combined use. These buildings are so disposed as to form three sides of a square separated from Elk Street by an iron grille fence, and round the three sides small cloisters are designed to give access to the various buildings separately and so contrived as to be enclosed in winter. The rooms do not, however, depend upon this for communication with one another or with the cathedral, as may be seen by the plan.

The Bishop's vestry and the treasury opening from a small sacristy are placed at the south side of the choir, communicating with the other vestries by means of the ambulatory.

The bridge across Elk Street to afford covered communication with St. Agnes School connects with the cloisters and thence through the side ambulatory direct to the seats in north choir aisle.

The building is proposed to be warmed by the introduction of pure heated air under the arches of the main arcades, avoiding thus the intrusion of gratings in main passageways, and also the ascending currents in the path of sound, which are great obstacles to hearing.

Keeping in view the doubtful character of the subsoil the arcaded system of wall-construction has been carried out as thoroughly as is usual in old Gothic buildings. The walls of the triforium, for example, are three feet four inches thick, made up of two one-foot walls, the inner one pierced with arches, an arrangement reducing the weight one-half, and giving beautiful and appropriate features to the interior, and offering an acoustic improvement in breaking up reflecting surfaces of wall. The same principle governs the construction of the clerestory and the central lantern, etc. But its greatest application is in bringing the side-aisle walls near to the main arcades, and uniting them in one foundation of unusual breadth, so that it may be said that the nave has hollow walls of enormous width, with the passage-aisles running through the hollow. Much value is attached to this disposition of weights. The simple walls it is proposed to build hollow, lightness, warmth and dryness being better secured, while the massive proportions of the masonry generally will contain an amount of material sufficient to insure stability. The buttresses where greater strain is concentrated will, of course, be solid. The foundations are of homogeneous concrete, covering nearly half the entire area.

The disposition of the passageways and seating space is shown upon the plan. The seating space is sufficient for a congregation of 1,550 persons, allowing five feet superficial to each. The stalls for clergy are 153 in number, and choir seats 54, making a total of 1,757 persons, but in a crowded state the edifice would certainly contain 2,000 persons.

The west front is flanked by towers, with belfries and spires, with freshness of design as far as that is consistent with the style. The height to top of belfry is 136 feet, and to top of finial 203 feet. The west end of nave with its traceried circular window is recessed between the towers, while the portals project somewhat.

The central tower, or lantern over the crossing, rises high enough above the nave roof to allow of a well-proportioned arcade around it, and is also roofed with copper at a steep slope. It is one hundred and forty-four feet high at top of masonry (dormers), and one hundred and eighty feet to top of finial cross.

The pitch of the transept roof is less to admit more light to the central lantern below the inner vault.

The subordinate buildings, chapter-house, vestries, cloisters, etc., have been grouped and designed with a view to their effect upon the main building. Owing to the lower ground upon which they stand all the principal features of the choir rise well above them, and will gain by the contrast of size afforded; and the lower roofs and walls make a composition, carrying the sky-line down and toward the St. Agnes school buildings near by, bringing it into the group even if the projected bridge were not supplied to complete the connection.

The exterior walling is to be of Potsdam stone, with exceptionally flat, split or rock face. The trimmings, arches, jambs, shafts, water-tables, cornices, etc., are to be of hard Medina stone, as described for the interior.

The external dimensions of the plan are as follows: Total length, 260 feet, or with vestries, 286 feet; breadth across western front, 124 feet; breadth across nave, etc., 78 feet; breadth across transepts, 128 feet; breadth across choir and aisles, 97 feet.

The provisional building is shown upon separate drawings. All the main structure is built up to a height sufficient for a good appearance, and the accommodation is practically the same. The main arcades are all completely finished up to the top of string-course, except the carving, for which, however, a considerable sum is allowed to complete some important capitals as examples for the rest. The triforium, instead of being built a "blind" story as it will ultimately be, is pierced with windows to form a provisional clerestory. The vaults are necessarily omitted.

A stained open-timber roof as light as is consistent with safety is provided to temporarily cover the edifice.

The windows in the end walls are rearranged so that they come at proper heights in the provisional building, but very little of the brickwork thus built will have to be taken down, as it is in most cases so disposed as to form parts of the complete work.

The estimates include the bishop's throne, and clergy and choir-stalls of cherry or oak, with some of the carving upon them completed. The stone pulpit is also to be constructed in the same manner. Considerable amounts are included for provisional reredos, rood-screen and some decoration of the choir, and for re-erecting the organ. It is supposed that the present altar and baptismal font will be established in the new building.

To provide steady, continuous ventilation (upon which acoustic qualities largely depend) a ventilating *flèche* or spire is placed over the crossing of nave and transepts. Externally it serves to break the long lines and relieve the unfinished appearance of the temporary roofs.

Proposals have been obtained from two contractors of this city, for the works drawn and described for the provisional building. They are as follows: mason, $129,855; carpenter and other work, $19,695; total of all works and provision for extras, $149,550.

HOUSE OF WILLIAM FLACCUS, ESQ., ALLEGHENY CITY, PA. MR. CHARLES M. BARTBERGER, ARCHITECT, PITTSBURGH, PA.

RECOLLECTIONS OF FLEMISH ARCHITECTURE.[1] — I.

THE castle and grayish-white chalk cliffs of Dover are gradually receding in the distance, the *Calais-Douvres* is ploughing her way through the watery expanse, and gradually increasing the distance between us, as she makes for the French coast, whilst we, who are bound for the picturesque towns of Flanders, take a more northerly direction and are soon in mid-channel. So far the day has favored us. The sun is shining brightly as we speed onwards from Folkestone to Dover, the sea is lying calm, gray, and peaceful at the foot of the cliffs, and any anxious forebodings that might have troubled our minds with regard to the weather on our journey to the coast are dispelled by the peaceful aspect of the ever-varying ocean. We are two in number, both imbued with the desire to glean some grains of inspiration from the relics of mediæval architecture in the Low Countries, and to return home with a larger knowledge of the characteristics and details of the edifices which lend so great a charm to the once busy and prosperous Flemish cities. We are now in the midst of the North Sea; the sun is hiding itself behind banks of gray cloud, the brightness to a large extent has departed, the wind, which to commence with was merely a gentle breeze, has increased in intensity, and is stirring up the surface of the sea into leaden-colored billows, crested with foam, and our little craft, which is not of large dimensions, is pitching and rolling, and quivering and creaking from bow to stern. The next two hours are rather trying ones to the travellers on deck, who comprise several nationalities, all easy to detect by their characteristic countenances. Many, my companion among them, take refuge in the cabin, others crouch in woe-begone attitudes, tarpaulin-covered, on the seats by the sides of the vessel trying to forget their miseries. One or two more courageous souls try to find their sea-legs by walking in zig-zags along the deck, biting their cigars, every now and then receiving a shower-bath of spray, whilst I, clinging to one of the ropes of the rigging, endeavor to equalize the motion of the vessel in a way not easily described, but tolerably successful in its results, and gaze anxiously for the first sight of land. At last patience receives its reward. A weather-beaten mariner points out the towers of Dunkirque (our ancient possession), the low sandy dunes are visible on the horizon, and stretch on and on until Nieuport is reached. Then another interminable stretch of banks of sand until

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[1] A paper read before the Leeds Architectural Association, by W. H. Thorp, and published in the *Building News*.

Ostend comes in sight, the glass-domed roof of the Kursaal glittering in the sun, which has again deigned to favor us, forming a conspicuous landmark for many miles. Approaching nearer, the miscellaneous collection of buildings begin to assert their respective identities, and we see a fine range of modern handsome buildings, hotels and private houses, facing the sea, and fronting on to the promenade, or Dique as it is called, terminated at one end by the king's wooden summer palace, and at the northern extremity by the old wood piers and quaint, stumpy light-houses. We are now gliding along in smooth water between the wooden piles, and at last are moored alongside the quay, opposite the Douane, where the custom-house officers, two or three gens-d'armes and a motley crew of blue-bloused porters and wharfingers are awaiting our arrival.

For one who has never been abroad before, Ostend is not exactly the place one would choose to make a first acquaintance with foreign soil. It is too new and modern. The buildings fronting the sea are all asserting their recent origin, and might to all appearances have been transported from one of the new boulevards in Brussels. The season has not yet commenced, and most of the hotels and handsome houses on the Dique have their windows and plate-glass fronts covered with huge shutters, to protect them from the ravages of the gales, and the blinding clouds of sand which blow up from the beach, over the sea wall, and across the promenade against the buildings, cutting the unprotected faces of the venturesome passers-by who are sufficiently daring to brave the fury of the elements. Our baggage is very modest as regards quantity, only two Gladstone bags, which are not even opened by the officials, who hastily mark them with white chalk, and two packages containing drawing-boards and sketching-materials in black glazed cotton cases, which have a more suspicious appearance, and are overhauled and looked into with curious, prying eyes by the *douaniers*, who, however, are soon satisfied that no attempt is being made to defraud the public revenue. A long, jointed measuring-staff, the property of my friend, in appearance like a fishing-rod, which never came into requisition, and was often a cumbrous hindrance when hurrying through the streets to catch a train, having a malicious trick of its own of occasionally tripping up an unsuspecting wayfarer, completed our belongings. On our journey from London to Dover we had occupied ourselves in consulting the guide-books to find out a suitable hotel in which to spend the Sunday before proceeding on our travels to Bruges, and decided in favor of Hôtel du Lion d'Or, which we had not much difficulty in finding in the Place d'Armes—a quiet place which we had all to ourselves for the most part, and which we should not have cared to patronize for a longer period than two or three days. In looking through the letters written at the time, I find that most of the hotels we went to bore the significant termination of "d'Or." One might imagine that gold was more plentiful in the Low Countries than elsewhere, judging from the number of golden animals they appear to be familiar with. In England the golden calf has been an acquaintance from the days of our childhood, but here they are on intimate terms with a whole Noah's ark full of animals made of that precious metal.

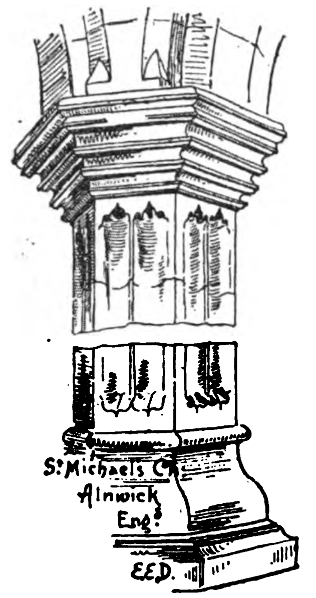
As has been previously mentioned, Ostend is no place for an antiquarian or a lover of the picturesque. No doubt, in the season, it presents a gay, animated, and brilliant appearance, as is the custom with all Continental watering-places; but out of the season it is decidedly dull and uninteresting. At present it is undergoing the process of spring cleaning and painting, preparatory to the gay whirl of excitement and fashion which will commence in a fortnight's time. The promenade on the Dique is being paved afresh, women taking the place of laborers and carrying bricks for the men and mixing up mortar and cement. The buildings fronting the sea are decidedly important-looking and handsome in appearance. Most of them may be described to be of Renaissance or Free Classic character, in which picturesque grouping and a florid and vigorous handling of detail have been more thought of by the architect than Classical proportions or purity of style. Here and there we meet with one or two successful attempts to revive the picturesque style of the sixteenth and seventeenth centuries, the buildings displaying as their leading features curved pedimented or crow-stepped gables, mullioned windows, corbelled arched projections, and ornamental floriated wrought-iron holdfasts to the tie-rods, which the Belgians have such an affection for. The materials chiefly used in these houses are bricks about two inches thick, of a deep red color, walled with thick joints, with dressings of a hard grayish stone, something similar in color to our mountain limestone. Besides using this for dressings round doors and windows, a common mode of treatment is to have bands of the stone at intervals of a few feet apart in the red brickwork of the front, which has the result of giving a striped appearance to the façade. This characteristic is met with in many ancient buildings both in Holland and Belgium, among which may be mentioned as examples, the Town Hall at Leyden and the old Fish Market in Antwerp, and evidently finds favor with the Flemish architects of the present day, for you find it a conspicuous feature in most of the modern buildings, both in those based on the style of the seventeenth century, contemporaneous with our Jacobean, and in more important edifices which are more decidedly Classical or Italian in character. One house on the northern end of the Dique arrested attention by the novelty of treatment displayed in its exterior. Although only a narrow building with a gabled end fronting the sea, the effect of light and shade obtained by the architect was admirable. On the ground-floor a deeply recessed loggia, spanned by an elliptical arch, formed a picturesque feature with its outside staircase leading to the entrance doorway, taken up alongside the interior wall and closed with delicate wrought-iron balustrading of artistic design. A few flowering shrubs in pots or tubs behind the low wall dividing the loggia from the street added color and life to the architectural background. The upper stories were characterized by nicely proportioned mullioned and transomed windows, bands of stone interspersed amongst the brickwork, an open arched balcony, and the whole surmounted by a curved pedimented gable-end adorned with obelisk-shaped finials.

Before leaving the Dique some notice must be taken of the seaside residence of the King of the Belgians, a wooden erection which looks like a gigantic summer-house. An English architect was responsible for its design, and it was fully illustrated in the *Building News* two or three years ago. Messrs. Lucas Brothers, of Lowestoft, were the contractors for the building, and the whole of the timber-work was put together there, afterwards being taken to pieces and shipped to Ostend, where it was reërected by English workmen on a structure of masonry previously prepared for it. The employment of foreigners having given rise to jealousy amongst the Belgians, an additional pavilion for the Queen was entrusted to a Brussels architect and native work-people. The palace is elevated above the beach, and in front of it is a wide terrace of considerable length, with means of egress from it at either end to the shore. It is constructed entirely of timber, the local bricks having been rejected on account of their porous character. The principal features of the building, as viewed from a distance, are the verandas fronting the sea, and an octagonal tower with a belvedere and flagstaff. Taken as a whole, it has an unsubstantial, cardboard-like appearance, and it is cause for regret that material of a more substantial character was not employed for at least a portion of the erection. The walls, if built of the deep red brick obtainable in the locality, although rather porous in nature, if constructed with a hollow cavity and well backed behind with common brickwork or concrete, would have had no difficulty in withstanding the inroads of the weather. The upper part of the building might have been carried out in half-timbered style with panels filled in with brickwork and cemented, finished a vellum color, with tile-hung or boldly timbered gables, and the roof covered with brindled tiles of hard and durable quality. The verandas might have been retained, but designed in a rather more vigorous and artistic manner. This character of building may now be seen carried out in some of the hotels and residences of our English seaside resorts, the results being usually highly satisfactory, as compared with the stucco and rough-cast crudities formerly in vogue. Our cousins across the Atlantic have also learnt a thing or two during the last few years; and judging from illustrations of buildings recently carried out at one or two of their watering-places, they do not intend to be behindhand in producing work of an artistic character which will tend to enhance the natural beauties of the situation, instead of detracting from them.

Returning to Ostend: a fine new railway station is in course of erection, and is now nearly completed. Strange to say, the style adopted is decidedly English in character, and the architect who designed it has evidently been inspired by the Tudor buildings in Oxford or Cambridge, or otherwise has a close acquaintance with Pugin's works illustrative of this particular phase of art. In composition the building is fairly effective, but the detail is rather too bold and crude, and lacks the delicate niceties of contour of moulding which are nowhere met with in greater perfection than in the works of our leading English ecclesiastical architects. But enter the interior, and there we find we have much to learn. If we excel them in beauty of moulding, they can completely eclipse us in the lightness and delicacy of their iron roofs. It is evident wrought-iron is used in preference to cast, and where we use four or five tons of metal, as a usual thing they are content with one. Compared with the roof of the new station approaching completion at Bruges, that at Ostend is plain in character and detail. At Bruges we have, besides the constructional parts of the roof, spandrels enriched with ornamental hammered work of exquisite design, ribs elaborated with beaten flowers and delicate tendrils — work in fact which we English are accustomed to associate with chancel-screens and sanctuary gates, and not to expect to see used in so utilitarian a structure as a station-roof. Compare this roof at Bruges or that covering the Bourse at Antwerp (built not many years ago) with that of the station at York, and I feel sure that the majority of my audience would record their votes in favor of the Belgian structures. Whilst upon the subject of wrought-iron work, mention must be made of the modern wrought-iron balconies which abound everywhere, and are noticeable for their artistic design and the beauty of their workmanship. In character many of them resemble the style of work now in vogue here in connection with buildings of so-called Queen Anne or Renaissance work, although some are still more fanciful in form, and recall the era of Louis Quatorze.

Discovery of a buried Portuguese Vessel in Burmah. — A Portuguese vessel of the sixteenth century has been found embedded eight feet below the ground, near Rangoon, in British Burmah. While cutting the Twantay Canal through the barren country, in order to facilitate communication between Rangoon, Bassein, and other stations, the laborers came on the stem of an old ship, very much damaged, and managed to successfully unearth their find, which is now in the Phayre Museum, Rangoon. It is one hundred and fifty feet long, and must have been of about two hundred and fifty tons burden.

"WATER-HAMMER" IN STEAM-PIPES.[1]



THE writer has been called upon during the past winter, in the course of his professional work, to examine into the systems of steam heating in use on so large a scale in New York city and elsewhere, and to report upon the condition and capabilities of one of those "plants" which have been put in operation. In the course of this investigation he was compelled to examine into the peculiar methods of injury to which long lines of steam-pipe thus used are exposed.

The action familiarly known as "water-hammer" had been long known to him, as to every engineer who has had much to do with steam power, and its singular effects had been often observed and commented upon by him, as by others; but, in this case, these effects were developed on so large a scale, and were so serious oftentimes in their consequences, as to impress upon him the desirability of examining into the matter more carefully than had yet been done. He has not been able to make a systematic and thorough investigation, such as he would have liked to make; but he has been able to collect some facts, a few of which will be here presented, that may at least have the effect of calling the attention of engineers more generally to this matter, and may lead to further study of the subject.

When a pipe is filled with steam, and then has introduced into it a quantity of cold water, or when a pipe, itself cold, and containing cold water, even in very small quantity, and without pressure, has steam turned into it, the first contact of the two fluids is accompanied by a sudden condensation, which causes a sharp blow to be struck, usually at the point of entrance; and sometimes a succession of such blows occurs, which are the heavier as the pipe is larger, and which may be startling, and even very dangerous.

It is not known, so far as the writer is aware, precisely how this action takes place in all cases, or what conditions are most favorable to the development of the tremendous pressures which are often produced. Perhaps the action is as follows:

The steam, at entrance, passes over, or comes in contact with the surface of the cold water standing in the pipe. Condensation occurs, at first very slowly, but presently more quickly, and then so rapidly that the surface of contact between the two fluids is broken, and condensation is completed with a suddenness that produces a vacuum. The water surrounding this vacuum is next projected violently from all sides into this vacuous space, and crossing it, strikes upon the surface surrounding it. As water is nearly incompressible, the blow thus struck is like that of a solid body, and the intensity of the resulting pressure is the greater as the distance through which the portion of surface attack can yield is less. In this manner enormous pressures are sometimes produced.

In some cases it seems certain that such pressures may be caused at points in the pipe far from either end, and from the point of entrance of the steam. For example, a pipe may lie in a nearly or quite horizontal line, and, if not fully drained, may contain a considerable quantity of water lying in the lower portion, while the steam may flow in above it. The passage of this steam along the surface of the water may cause some disturbance of the surface of the liquid, and this disturbance being gradually increased as the flow of steam becomes more rapid, may finally cause a break in the surface of the water, which disturbance may produce more rapid condensation and still further agitate the mass, until condensation occurs with such rapidity that a vacuum is formed at the point of greatest action. The next result is the rushing of steam from both directions towards this point, carrying with it, as it goes, masses of water which, coming from opposite directions with enormous velocity, meet at the intermediate spot at which the condensation has been most rapid, and being stopped by instant collision, produce a pressure which may only have as its limit the strength of the pipe.

Where pipes are not burst by this action, it is common to see them sprung and twisted out of line, torn from their connections, and, when a succession of shocks occur, as is often the case, the whole line writhes and jumps lengthwise to an extent that is sufficiently serious to cause well-grounded alarm.

The writer had an opportunity, in the course of his work on the case above alluded to, to obtain some probably approximate measures of the intensity of this action in long and heavy lines of pipe. Four lengths of 8-inch pipe had been split by this action, and the writer desired to ascertain whether they remained, in their injured condition, strong enough to bear the ordinary steam pressure of the line from which they were taken. This never rose above fifty or sixty pounds per square inch. They were therefore subjected, in a proving-machine, to gradually increased pressures until the already fractured parts were still further injured, the repairs, or rather the patching having been carefully done in such a way that they were not strengthened by it. This was done by putting on soft patches along the line of the split and securing them by bolts which were set in the line of the split. The patches thus served as simple top-valves, preventing the exit of the water through the break.

The following are the results of the tests:

Pipe No. 1.—This pipe was split, near one end, for a distance of fifteen inches, along the line of the weld. When placed in the proving-machine, it bore the applied pressure until it attained an intensity of 400 pounds per square inch, when the split suddenly extended about ten inches; the pressure could no longer be kept up, and the test terminated.

The pipe was then taken to a pipe-cutting machine, and the injured part cut off. It was then again subjected to pressure. It bore a pressure of 1,100 pounds per square inch,—the highest that it was convenient or customary to apply to that size,—and was taken out sound.

Pipe No. 2.—This length was cracked for a distance of fifteen inches along the line of weld, not far from the middle of its length. The crack had opened a little and the pipe was slightly bulged. This piece bore 300 pounds and then gave way, the fracture extending just enough to let off the pressure.

At the opposite end of the pipe was another split, eight inches in length. The part just fractured was cut off, and the remaining portion was again subjected to the water pressure. This time it bore 1,050 pounds per square inch, when the crack was started and ran about fifteen inches. It began leaking, and showed plainly the effect of the pressure at about 800 pounds.

This was an unusually interesting specimen, as the pipe had been bulged considerably by the water-hammer along the line of the 8-inch crack. The pressure afterward borne, therefore, seemed to the writer to be likely to be a fair measure of that produced originally by the water-hammer. Such bulging as was here seen never occurs at usual pressures. The new break did not follow the weld, but ran irregularly, and apparently indifferently, through weld or solid iron.

Pipe No. 3.—This length was split for a distance of twenty-two inches, the end of the break being about three feet from the end of the pipe. It sustained a pressure of 250 pounds. The sound part of the pipe was then tested up to 1,050 pounds without injury.

Pipe No. 4.—This piece was split, like the last, and to just about the same extent: was tested similarly, and gave way at 300 pounds per square inch.

All of this pipe was 8-inch pipe, ⅜-inch thick, and made with the usual form of lap-welded joint. The welds were not always perfect, as is probably the fact with all such pipe; but this pipe, butt-welded, would have borne very much higher pressures than those to which it was subjected in ordinary work by the steam carried on the line. It cannot be asserted that these lengths of pipe did not split under pressures less than those to which they were afterward subjected by the writer, as it is very possible that the first blow may have found a weak part of the pipe, and the split may, in some cases, have extended to stronger portions. Nevertheless, the writer is inclined to believe that this was not the case in all instances, and is convinced that in one case at least—that of the 8-inch crack, which was accompanied by a decided bulge in the pipe—the water pressures, at the test, were, at least approximately, equal to, and are very likely to have exceeded, those obtained at the later test. It seems to him very certain that we may consider it as proven that the pressures produced by "water-hammer" are often enormously in excess of those familiar to us in the use of steam, and that they have in many cases exceeded 1,000 pounds per square inch. It is, then, evident that it is not often safe to calculate upon meeting these tremendous stresses by weight and thickness of metal, but that the engineer must rely principally, if not solely, upon complete and certain drainage of the pipe at all times as the only means of safely handling steam in long pipes, such, especially, as are now coming into use in the heating of cities by steam led through the streets in underground mains.

The facts here presented have been, to the writer, something of a revelation, and have seemed to him to possess unusual interest and importance to the engineer using steam under such conditions as are here referred to. It is a fact which has long been well known, that these suddenly produced pressures are often very great. The writer has occasionally, for many years, known of serious and sometimes fatal accidents due to this cause; but that these stresses are often as great as is here indicated has probably been as little realized by engineers generally as by him.

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[1] A paper by Prof. Robert H. Thurston, read before the American Society of Mechanical Engineers, June, 1883, and published in the *Journal of the Franklin Institute.*

MOULDS FOR CEMENT PIPE.

86 PUTNAM ST., SYRACUSE, N. Y., July 9, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Will you be kind enough to inform me where I can purchase cast-iron moulds for manufacturing cement sewer-pipe? Cannot find any advertisement in your paper that will give the address of any parties making such an article. You will confer a great favor by answering the above inquiry. Yours truly,

JOHN S. VILLAR.

[WE refer this to our readers.—EDS. AMERICAN ARCHITECT.]

THE SECRETARYSHIP OF THE AMERICAN INSTITUTE OF ARCHITECTS.

American Institute of Architects, Secretary's Office,
Bryant Building, 55 Liberty St., New York, June 11, 1883.

To the Editors of the American Architect: —

Dear Sirs,— Permit me to make use of your far-spread and ever-hospitable columns to inform the wide-scattered members of the Institute that the Trustees, at a meeting held here on the 7th inst., were fortunate enough to be able to persuade Mr. George C. Mason, Jr., of Newport, and late Secretary of the Rhode Island Chapter, to accept the Secretaryship of the Institute *pro. tem.*, during my own absence for several months in Europe, a step forced on me by the fact that my health has been considerably deteriorated by overwork. On this account, though I accepted a trusteeship, I declined, at the last convention, a re-election as Secretary, and I have since held over the latter office simply because Mr. William R. Ware, who was elected to it, has positively declined to serve.

Mr. Mason is well known as the author of several able essays on subjects which have, within the last few years, interested alike the public and the profession, in which he is so active and successful a practitioner, and the Institute is to be congratulated as long as he continues to hold the office. But well knowing how much time and careful consideration its current and unpaid duties absorb from its incumbent's private interests, I beg your readers to allow me to bespeak for him only such correspondence—and that well-considered and well-condensed — as may be essential to the well-being of the profession, and the enlargement and success of its recognized organization, the Institute. Yours truly, A. J. Bloor.

NOTES AND CLIPPINGS.

The Fort Duquesne Block-house. — There are probably a select few of the citizens of Pittsburgh who are aware that a location of great historic interest exists in that smoke-begrimed city; but it is a fact that the majority of the citizens of that town could not find the old Fort Duquesne block-house without a guide. Surrounded by all kinds of dilapidated tenements, itself occupied as the domicile of a poor family, the fortress for which nations strove and which armies marched and died to assault or defend a century and a half ago is as good as buried from public view. It is discreditable to the city which originated and grew up around these historic walls that the old fort has not been preserved and made the chief point of attraction to all patriotic people who visit its busy marts. A movement has lately been set on foot to acquire the property and create a public park, of which it shall be the chief attraction. It is to be hoped the enterprise will be something more than merely talked about. The people of Pittsburgh owe it to themselves to rescue this monument of the early occupation of our country from the oblivion into which it has fallen. No city on the continent has so proud a monument of the heroic days of the republic's vigorous childhood and youth as this. It should be preserved to the latest possible time. —*Philadelphia Times.*

Raphael's "Madonna della Staffa."— St. Petersburg has narrowly escaped losing the most precious of its art treasures, the celebrated Madonna della Staffa of Raphael. The picture, which for more than three centuries and a half belonged to the Staffa family, was purchased in 1870 by the Emperor of Russia for £12,400, and was by him presented to the late Empress, who at her death bequeathed it to the art museum at the Hermitage. The heated air of the gallery in which the picture was hung recently split the square pine panel on which Raphael painted his masterpiece, and for a time it was feared that the danger was irreparable. A certain artist named Sidoroff volunteered at last, however, to set matters right. After carefully supporting the face of the picture with linen backed by a slab of marble, he laboriously rubbed away the panel, first with files and afterward with powdered glass, and then succeeded in mounting the thin remaining film on canvas. In the course of this delicate operation it was discovered that, instead of the book which the Madonna in the picture now holds, there was originally a pomegranate, toward which the infant Jesus stretched out his hand with childish curiosity. —*St. James's Gazette.*

A Submarine Observatory. — The Marseilles correspondent of the *London News* writes: The International Exhibition at Nice is reserving some wonders for the foreigners who may propose to pass a portion of the winter of 1883-84 upon the borders of the Mediterranean. One of these wonders is a balloon which its inventor, M. Toselli, calls "the observatory under the sea." It is made of steel and bronze, to enable it to resist the pressure which the water produces at a depth of one hundred and twenty metres. This "observatory under the sea" has a height of eight metres, and is divided into three compartments. The upper apartment is reserved for the commander, to enable him to direct and to watch the working of the observatory, and to give to the passengers the explanations necessary as to the depth of the descent, and what they will see in the depths of the sea. The second apartment, in the centre of the machine, is comfortably furnished for passengers to the number of eight, who are placed so that they can see a long distance from the vessel or machine. They have under their feet a glass which enables them to examine at their ease the bottom of the sea, with its fishes, its plants and its rocks. The obscurity being almost complete at seventy metres of depth, the observatory will be provided with a powerful electric sun, which sheds light to a great distance in lighting these depths. The passengers have at their disposal a telephone, which allows them to converse with their friends who have stopped on the steamboat which transports the voyagers to such places as are known as the most curious in the neighborhood. They have also handy a telegraph machine. Beneath the passengers an apartment is reserved for the machine, which is constructed on natural principles, that is to say, as the bladder of a fish, becoming heavier or lighter at command, so as to enable the machine to sink or rise at the wish of the operator.

The Refuse of Furnaces for Building Purposes. — On the utilization of the refuse material from blast furnaces for mortar for building purposes, Mr. W. Mattieu Williams, F. S. A., relates some interesting experiences. It is far from a new idea to make a conglomerate from the slag of a furnace for building purposes, and Mr Williams thinks he has heard of its use in finer work, and he concludes from the chemical nature of the cinder heaps found around furnaces that their composition renders them well suited for many purposes where lime-mortar is now used. The slag refuse is composed of silicates of lime and alumina, intermingled with silicates of iron, manganese, and magnesia in variable proportions. When the silica is in excess they are glassy; when the proportion of lime is greater they are earthy. These earthy cinders pulverize spontaneously, and are those which, I believe, have been used directly for cement; but I should expect the best result from the glassy cinders (or "slags" as they are improperly called), as these contain sufficient silica to combine actively with the lime of mortar, and thereby harden efficiently. While on the subject I may mention a little device which I adopted in building the brickwork setting for the retorts, premising, however, that I began at this work quite as a novice, a purely amateur builder. At first I contracted in the usual manner with the bricklayer, at so much per cubic foot measured all over, I finding all materials, he only doing the work. The work was badly done in spite of all my vigilance, and the discharging of three or four bricklayers in succession, the fault being that the bricks were not laid closely enough, and the thick joints of mortar crumbled when the whole structure was heated. At last I found a remedy for this which was very simple. Instead of finding *all* the materials I only found the bricks, leaving the contracting workman to supply his own mortar, and of course paying him accordingly. The difficulty of making each brick to rest in firm contact with its neighbor, with no more mortar between each than was necessary for filling up inequalities of surface, immediately disappeared.— *Scientific American.*

Origin of Jade.— A correspondent writes to *Nature:* "During the last ten years much has been written on the origin of the jade objects found in America and Europe, no raw materials of the stone having yet been discovered out of which the articles could have been manufactured. Professor H. Fischer, of Freiburg in Baden, therefore brought forward the hypothesis, supported by several of his scientific brethren, that the jade objects of America had been transported thither from Asia in prehistoric times, when Mongolian tribes settled in the New World, and that the intercourse of trade had later acted in the same manner. For Europe, where thousands of these objects have been found, the Aryans had done this service, when wandering from the very heart of Asia to the west, the source of the jade objects of both continents being Asia, where deposits of the mineral are known to occur in Siberia, Turkestan, and Burmah. Recently Dr. Meyer, of Dresden, has energetically opposed these views in a large folio work containing many plates, and has come forward with the opinion that the jade sources of Europe and America yet remain to be discovered. As to America we are glad to hear that this much simpler and more reasonable explanation of the problem has now been verified, the Smithsonian Institution of Washington lately having received from Louisiana an immense number of objects of jade, among them implements, knives and other articles, many having an admirably high finish, and with them a considerable quantity of the stone of which the objects were made. We do not doubt that similar discoveries may soon be expected in Europe, especially in Switzerland, and that we shall succeed in ascertaining the exact districts where the mineral is to be found."

Ab Centro ad Astra.— The directors of the Glasgow City and District Railway have been again frustrated in their attempts to construct a railway under houses without paying compensation. Two cases were brought last week before the Court of Session, and it was again affirmed that the ancient principle is still applicable, and that the owner of the surface of a piece of ground has rights to all the strata beneath it. What is of more importance, it was laid down by the Lord President that the rights were stronger when a house stood on the surface. According to his lordship, as long as land is unbuilt upon, "land is the proper description of the property; but when ground is built upon the *solum* on which the house rests is never described as land. The owner, therefore, becomes the owner of house property instead of landed property; and if he conveys his estate, the manner in which he conveys it is by disponing the house without the slightest reference to the soil on which it stands. There can be no doubt of the application of the general rule that the owner of the surface is owner *ad centrum;* or in other words, the vertical measurement of his property is indefinite— it has no limit. Therefore, it seemed to the Lord President to be abundantly clear that where the property belonging to the owner was a house, the ground on which that house stood was just as much a part of that house as the walls or roof of it, and the ground on which it stood was not a few inches, or a few feet, or a few yards in depth from the surface, but it was the entire underlying strata as far as the imagination could carry one. In this opinion the other judges concurred, and unless there is some new discovery by their lawyer the railway company in Glasgow will have to pay for the site of their line. — *The Architect.*

Malaria in Italy. — The Italian Minister of War has just issued a discouraging report on the subject of malaria in Italy, with a statistical map showing the position of the malarial districts and their relative standing as respects the danger of infection. At the present time only six of the sixty-nine provinces of the kingdom are free from poisonous exhalations, and upwards of 40,000 soldiers are annually affected at a cost to the Government of $2,000,000. Moreover, malaria throws thousands of workmen out of employment, prevents the cultivation of large tracts of land, and is altogether an enormous economic drawback. It is worthy of note that with the construction of railways the malaria area has increased at an alarming rate, the explanation being that the excavations have brought much swamp land to the surface and interrupted natural drainage.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

280,342. DOOR-HANGER. — Wilbur F. Berry, Chicago, Ill.

280,354. SHINGLE-MACHINE. — John R. M. Crawford, Booneville, Miss.

280,358. COMBINED PLUMB, SQUARE AND LEVEL. — William H. Dehney, Rochester, N. Y.

280,368. REAMER. — Cicero R. C. French, Providence, R. I.

280,373. FIRE-ESCAPE LADDER.—Justus H. Heath, Mott's Corners, N. Y.

280,374. MOUTH-PIECE FOR SPEAKING-TUBES. — Max Heidelmeier, Chicago, Ill.

280,376. AUTOMATIC FIRE-EXTINGUISHER. — Geo. W. Horton, Cincinnati, O.

280,390. DIVIDERS. — William H. Mitchell, Boston, Mass.

280,398. CARPENTER'S SQUARE. — Edwin Prescott, Arlington, Mass.

280,400. SASH-FASTENER. — William E. Rines, Arlington, Mass.

280,407. PILE-DRIVER. — Jesse P. Seawell, Hope, Ark.

280,415. MORTAR-TUB. — John P. Thomas and Daniel J. Thomas, Turner's Falls, Mass.

280,417. WATER-CLOSET. — William H. Umpleby, Trenton, N. J.

280,419. SAFETY ATTACHMENT FOR ELEVATORS. — Frederick W. Voerde, Chicago, Ill.

280,420. BORING-TOOL. — Josiah Wade, Halifax, County of York, England.

280,432. DRAWING-APPARATUS. — William S. Worden, Kearney Junction, Neb.

280,433. FIRE-ESCAPE LADDER. — Thomas Wyatt and Jason F. Holmes, Providence, R. I.

280,440. LUMBER-DRIER. — William S. Bates, Chicago, Ill.

280,445. SASH-HOLDER. — Russel B. Callahan, Lansing, Mich.

280,448. FAUCET.—William Cassin, Brooklyn, N. Y.

280,453. WOOD-TURNING MACHINE. — James D. Craig, Detroit, Mich.

280,457. CROSSCUT-SAWING MACHINE. — William A. Doherty and Charles G. Van Sickel, Muskegon, Mich.

280,462. LOCK-HINGE. — Adolph Gärtner, Jersey City, N. J.

280,488. COMBINATION LOCK. — Henry Lemmon, Guelph, Ontario, Can.

280,492. ORNAMENTAL MANTEL, CEILING, ETC. — John McCully, Chicago, Ill.

280,494. WEATHERBOARD GAUGE. — Joseph C. McEwen, Lochloosa, Fla.

280,497. HAND-SAW. — Thomas U. Mekeel, Cold Spring, N. Y.

280,517. LOCK. — James Roche, Terryville, Conn.

280,526. VENTILATOR. — George Smart, St. Louis, Mo.

280,527. FIRE-ESCAPE WITH AN ALARM-ATTACHMENT. — Jas. H. Smiley, Caroline, N. Y.

280,538. FIRE-ESCAPE. — Morgan S. Washburn, Billings, N. Y.

280,539. DEVICE FOR ADJUSTING ROSES TO DOORS. — George Watkins, Detroit, Mich.

280,545. GREASE-TRAP. — Silas Wilcox, Portland, Oreg.

280,581. DOOR-LATCH. — Samuel L. Coales, Newport-Pagnell, England.

280,594. VENTILATING-APPARATUS.—John Fernie, Philadelphia, Pa.

280,595. APPARATUS FOR VENTILATING APARTMENTS. — John Fernie, Philadelphia, Pa.

280,607. BIT-STOCK. — Frank Grant, Chester, Mass.

280,609. SASH-CORD GUIDE. — Winfield S. Greening, Decatur, Ill.

280,612. RE-ENFORCING PLATE FOR SAW-HANDLES. — William H. Hankin, Jr., and Cornelius Tinney, Brooklyn, N. Y.

280,643. SASH-HOLDER. — William C. Mathews, Shenandoah, Iowa.

280,645. APPARATUS FOR HOISTING AND CONVEYING EARTH FROM SEWER-TRENCHES. — Patrick H. McCauley, Des Moines, Iowa.

280,648. WATER-CLOSET VALVE. — Timothy McHugh, Cambridge, Mass.

280,653. FIRE-ESCAPE. — Myron E. Moore, Woodford's, Me.

280,668. STEAM ROCK-DRILL. — Joseph W. V. Rawlins, Houghton, Mich.

280,670. ELEVATOR. — Frank M. Reynolds and Geo. M. Tewksbury, Newark, N. J.

280,673. WRENCH. — Carl Schinke, St. Louis, Mo.

280,679. MORTAR AND BUILDING COMPOSITION. — Joseph A. Shinn, Pittsburgh, Pa.

280,681. ROOFING. — William C. Smalstig and William Massey, Springfield, Mo.

280,706. SPIRIT-LEVEL. — Thomas W. Wood, Asbury Park, N. J.

280,728. DOOR-KNOB. — Charles Elveena, Detroit, Mich.

280,787. EAVES-TROUGH. — Joshua P. Gould, Bangor, Me.

280,741. FIRE-ESCAPE. — John Harper, Duncannon, Pa.

280,756. WINDOW-BEAD FASTENER. — Charles H. Myers, Phelps, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

WAREHOUSE. — D. E. Conklin, Esq., is to build a five-st'y warehouse on Sharp St., between Lombard and German, of brick and iron, with stone and terracotta finish, cost $20,000, from designs by Chas. L. Carson, architect.

BUILDING PERMITS. — Since our last report sixteen permits have been granted, the more important of which are the following: —

James D. Hodge, 4 two-st'y brick buildings, e s Division St., between Dolphin and Hoffman Sts.; and 4 three-st'y brick buildings, w s Etting St., between Dolphin and Hoffman Sts.

Catherine McDonald, three-st'y brick building, w s Duncannon Alley, between Bank St. and Eastern Ave.

Dr. H. F. Hill, three-st'y brick building and brick stable in rear, s w cor. Schroeder St. and Edmondson Ave.

D. Wright, 6 two-st'y brick buildings, s s Fort Ave., between Hanover and Race Sts.

Boston.

HOUSE. — Messrs. Allen & Kenway are the architects of a house for Mrs. C. L. Carr, on Beacon St. It is of brick and stone, three stories, 26′ x 70′; Messrs. L. P. Soule and Leander Greely, contractors.

BUILDING PERMITS. — *Wood.* — *Lake St.*, near Kendrick St., Ward 25, for Phineas B. Smith, 2 buildings for storage of ice, 32′ x 100′ each, one-st'y pitch; Peter Hutchinson, builder.

West First St., Nos. 325 *and* 327, Ward 14, for Thomas P. Frost, 2 buildings for storage of wagons, 25′ x 55′ each, one-st'y flat; Laming & Drisko, builders.

Chicago.

BUILDING PERMITS. — Chas. Schumacher, three-st'y flats, 367 South Morgan St.; cost, $4,000.

Grace Episcopal Church, one-st'y church, Girard St.; cost, $3,000.

A. F. Ewing, 6 two-st'y dwells., Thirteenth Pl.; cost, $12,000; architect, Treat; builder, A. Beiwold.

J. B. Barry, three-st'y dwell., 237 Park Ave.; cost, $7,000; architect, J. J. Flanders; builder, Duffy.

Geo. F. Whidden, 2 three-st'y flats, 64 and 70 St. John's Pl.; cost, $5,000; architect, W. Stripleman; builder, W. Hickox.

Geo. F. Whidden, 2 two-st'y flats, 66 and 68 St. Johns Pl.; cost, $4,000.

Mrs. C. J. Armstrong, two-st'y flats, 306-308 Honora St.; cost, $16,000; architect, J. W. Armstrong; builder, Ed. Hayden.

S. Gregsten, three-st'y and basement front addition to flats, 1804 and 1806 Wabash Ave.; cost, $4,000.

B. & P. Mahon, three-st'y flats, 2716 South Dearborn St.; cost, $5,500; architect, J. J. Eagen; builder, B. Mahon.

Wm. Gorden, two-st'y store and dwell., rear 130 North Ashland St.; cost, $3,700.

C. P. & P. J. Sullivan, three-st'y store and flats; cost, $4,500.

John O. Couski, two-st'y and basement flats, 718 Noble St.; cost, $3,600.

J. M. Steuben, four-st'y basement store and flats, 56 West Indiana St.; cost, $8,000; architect, F. Thompson; builder, J. Steuben.

J. Kincade, 2 two-st'y and basement dwells., 594 and 596 South Halsted St.: cost, $4,100.

S. F. Orginstall, two-st'y dwell.; cost, $4,500; architect, S. T. Orginstall; builder, E. T. Gobill.

Thos. Sneda, three-st'y and basement store and flats, 590 North Ashland Ave.; cost, $6,500; architect, J. Kolff; builder, D. Sneda.

Peter Smith, two-st'y basement dwell. and store, 3637 Halsted St.; cost, $4,300.

Dennis S. Sherman, two-st'y dwell., 48 Sloan St.; cost, $4,500; architect, Henry Clay; builder, Rudnik.

C. H. Blair, 2 two-st'y dwells., 2909 and 2911 Prairie Ave.; cost, $17,000; architect, E. Bowman; builders, Griffiths & Co.

Thos. Dunne, two-st'y dwell., 408 South Morgan St.; cost, $3,400.

John Ryan, two-st'y and basement dwell., 3150 Indiana Ave.; cost, $5,000.

Wm. Atkins, 2 two-st'y dwells.; cost, $6,500; architect, P. W. Ruehl.

N. P. Smith, 2 two-st'y dwells., 3263-3265 Groveland Park.

F. H. Gault, 4 two-st'y dwells., Congress St.; cost, $12,000.

Mrs. L. K. Smith, two-st'y dwell., cor. State and Schiller Sts ; cost, $30,000.

Anton Hottinger, four-st'y flats, 312 and 314 Sedgwick St.; cost, $15,000.

Wm. Schroeder, two-st'y dwell., 699 North Park Ave.; cost, $5,000.

G. Thompson, two-st'y dwell., 234 Hubbard St.; cost, $3,000.

Mrs. Wm. Moore, cottage, 452 North Paulina St.; cost, $2,000.

Thomas Olson, three-st'y flat, 346 West Erie St.; cost, $10,000.

O. J. Franchere, three-st'y store and dwell., 24′ x 51′, 316 Blue Island Ave.; cost, $10,000; architects, Burling & Whitehouse; builder, A. Kaiser.

C. Le Beau, three-st'y flats, 22′ x 50′, 12-16 Gold St.; cost, $6,000; architect and builder, C. Le Beau.

J. Cordano, three-st'y flats, 22′ x 56′, 104 Centre Ave.; cost, $5,000; architect, N. W. Cussel; builder, M. Hutchinson.

Eich Bros., 5 two-st'y dwells., 50′ x 98′, 1059-1067 Wilcox Ave.; cost, $15,000; architect, Wm. Stripleman; builder, R. E. McKay.

D. Harry Hammer, three-st'y basement stores and flats, 50′ x 64′, 2718-3720 State St.; cost, $15,000; architect, Wm. Langherst; builder, A. Bomont.

F. Fleisepmann, three-st'y dwell., 28′ x 73′, 483 Dearborn St.; cost, $10,000; architects, Cudell & Blumenthal; builders, Sturm & Kueker.

J. A. Heath, two-st'y and basement dwell., 25′ x 50′, [illegible]222 Prairie Ave.; cost, $6,500.

J. A. Heath, two-st'y dwell., 24′ x 50′, 3136 Prairie Ave.; cost, $7,500.

Rev. S. Marretti, three-st'y and basement rectory, 25′ x 50′, 64 Illinois St.; cost, $6,000; architect, C. A. Alexander.

John Hubka, two-st'y and basement flats, 22′ x 70′, 79 Wade St.; cost, $4,500,

Thos. Olson, three-st'y flats, 45′ x 55′, 346 West Erie St.; cost, $10,000.

J. M. Allen, 11 one-st'y cottages, each 20′ x 28′; cost, $8,000; architect and builder, S. J. Hicks.

Denver, Col.

BUILDING PERMITS.— In the six months ending June 30, the Inspector granted 296 permits for the erection of buildings worth $899,670.

N. H. Meldrum, two-st'y brick residence, 36′ x 50′; cost, $8,500; barn, 28′ x 30′; cost, $1,500; Grant Ave., bet. East Seventeenth and East Eighteenth Sts., E. P. Brink, architect; Jacob Ott, builder.

F. D. Spaulding, two-st'y brick and stone basement dwell., 44′ x 66′; cost, $10,000; Glenarm St., bet. Lincoln Ave. and Twenty-first St.; E. F. Fassett, architect; R. P. McDonald and E. J. Noles, builders.

Dennis Sullivan, two-st'y brick dwell., with basement, 30′ x 60′; cost, $12,000; Colfax St., bet. South Fourteenth and Evans Sts.; F. E. Edbrook & Co., architects; A. F. Rafert, builder.

Detroit.

BUILDING PERMITS. — Peter Dupont, frame store, Seventh St.; cost, $3,800.

Geo. H. Fowler, brick store, Gratiot Ave.; cost, $7,000.

Wolverine Paper Co., factory, Campan Ave.; cost, $6,300.

J. V. Smith & Co., addition to dwell., 136 Howard St.; cost, $3,800.

Gearing & Co., additions to brick house, 666 Jefferson Ave.; cost, $8,700.

Michigan Central Station, Third St.; cost, $165,000.

W. G. Vinton & Co., art loan building, Congress St.; cost, $13,000.

R. Bolton & Co., double brick house, Lafayette Ave.; cost. $3,800.

Duest Bros., addition to Eagle Iron Works, Congress St.; cost, $2,400.

C. Hubbard, frame house, Piquette Ave.; cost, $2,400.

Macon, Ga.

WAREHOUSES. — English, Huguenin & Co., cotton warehouse and compress, cor. of Seventh and Poplar Sts.; A. Blair, architect.

U. M. Gunn, cotton warehouse, on Fourth St., between Cherry and Poplar Sts.; cost, $9,000; D. B. Woodruff, architect.

HOUSE. — M. J. Hatcher, brick and stone house on Georgia Ave.; Parkins & Bruce, architects.

STORES. — Willingham & Co., block of four stores on Second St ; cost, $3,500 each; P. E. Dennis, Jr., architect.

CHURCH. Baptist Church, at head of Poplar St.; cost, between $15,000 and $20,000, being built by day labor; D. B. Woodruff, architect.

New York.

BACHELOR APARTMENT-HOUSE. — It is proposed to erect a building on Forty-third St., in the fall, for bachelors; Mr. C. W. Clinton is preparing the plans.

STORES. — A seven-st'y store, 50′ x 115′, is to be built of brick, on the n e cor. of Forty-ninth St. and Third Ave., by Mr. Peter A. Cassidy, to cost about $80,000.

A five-st'y store is to be built of brick, with stone finish, 20′ x 50′, at No. 113 West Broadway, for Mr. G. Berndt, from designs of Mr. J. Hoffmann, to cost about $20,000.

TENEMENTS. — Several cheap tenement-houses are being designed, and this class of building forms the greater portion of work projected at the present time.

BUILDING PERMITS. — *One Hundred and Twenty-fifth St.*, 235′ e Sixth Ave., 5 four-st'y flats and stores, tin roofs; cost, total, $100,000; owner, John A. Hardy, Sing Sing, N. Y.; architects, Cleverdon & Putzel.

Sixty-seventh St., n s, 200′ w Eleventh Ave., 8 four-st'y brick tenements, tin roofs; cost, each, $10,000; owner, George Kuhm; architect, George J. Carey.

Eighty-ninth St., s s, 100′ w Third Ave., four-st'y brick and stone flat, tin roof; cost, $28,000; owner, Chas. E. Rhinelander, 158 East Eighteenth St.; architect, Geo. B. Post; builders, Peter Tostevin's Sons and Peter Leenan.

Eighty-ninth St., s s, 129′ 10″ w Third Ave., four-st'y brick and stone flat, tin roof: cost, $14,000; owner, architect and builders, same as last.

Water St., No. 240, four-st'y brick store, tin roof; cost, $15,300; owner, John H. Jones, 137 Adelphi St., Brooklyn; architect and builder, W. A. Vanderhoof.

One Hundred and Thirty-second St., n s, 225′ e Eighth Ave., 2 three-st'y brownstone front dwells., tin roofs; cost, each, $10,000; owner, Robert Lindsey, 2325 First Ave.: architect, J. H. Valentine; builder, John Hutchison.

One Hundred and Thirty-second St., n s, 253′ e Eighth Ave., 4 three-st'y brownstone front dwells., tin roofs: cost, $11,000; owner, architect and builder, same as last.

East Twelfth St., No. 20, five-st'y brick and stone flat, tin roof; cost, $40,000; owner, Thos. B. Tappan, 348 East One Hundred and Twentieth St.; architect, J. Wightman; builders, J. & W. C. Spears.

South St., Nos. 378 *to* 381, two-st'y brick factory, flat roof; cost, $9,000; owners, Herring & Co., 251 Broadway; architect, Andrew Craig; builders, Drummond & Jones.

Pearl St., No. 480, six-st'y brick store, tin roof; cost, $15,000; owner and architect, Thos. R. Jackson, 61 Broadway.

Madison Ave., s w cor. One Hundred and Twenty-seventh St., 5 four-st'y brownstone front dwells., tin roofs; cost, each, $18,000; owner, Franklin A. Thurston, 62 East One Hundred and Thirty-third St.; architect, G. Robinson, Jr.

Third Ave., w s, 50′ n One Hundred and Eighth St., 2 five-st'y brick flats, tin roofs; cost, each, $20,000; owner, Richard Connor, Astoria, L. I.; architect, G. Robinson, Jr.

One Hundred and Thirty-fourth St., n s, 275′ e Willis Ave., 2 four-st'y brownstone front tenements, tin roofs; cost, each, $10,500; owner, Hans Heinrich Schramm, 1365 Third Ave.; architect, Adolph Pfeiffer.

Third Ave., e s, 50′ 4½″ s Ninety-third St., five-st'y brick flat, tin roof; cost, $20,000; owner, Wm. Fernschild, 324 East One Hundred and Fourteenth St.; architect, Geo. Fernschild.

Pier 36, North River, wood and iron freight-shed and offices; cost, $40,000; lessee, Inman Steamship Co., Limited, 31 Broadway; architects, Chas. McDonald and A. Namur; builder, Chas. R. Hedden.

Fifty-seventh St., s s, 100′ w Second Ave., 2 two-st'y brick factories and show-rooms, gravel roofs; cost, total, $10,000; owner, Adolph Klaber, 165 East Sixty-first St.; architect, Henry Fernbach; builders, J. L. Murtha and A. E. Fountain.

East One Hundred and Fifth St., No. 317, four-st'y brick tenement, tin roof; cost, $8,700; owner, Christine Heinsohn, 54 Hewes St., Brooklyn; architect, and builder, Henry Hollwedel.

Second Ave., n w cor. One Hundred and Fourth St., 4 four-st'y brick tenements, tin roofs; cost, total, $55,000; owner, David Stevenson, 521 Tenth Ave.; architects, Thom & Wilson; builder, Robt. Auld.

One Hundred and Seventeenth St., n w cor. Lexington Ave., four-st'y brick tenement and store, tin roof; cost, $10,000; owner and builder, Jno. W. Warner, One Hundred and Sixth St., cor. Fifth Ave.; architect, Wm. Graul.

One Hundred and Seventeenth St., n s, 20′ w Lexington Ave., four-st'y brick tenement, tin roof; cost, $8,000; owner, builder and architect, same as last.

One Hundred and Seventeenth St., n s, 39′ w Lexington Ave., four-st'y brick tenement, tin roof; cost, $11,000; owner, builder and architect, same as last.

St. Nicholas Pl., e s, 75′ n One Hundred and Fiftieth St., 2 three-st'y stone and frame dwells., slate roofs; cost, total, $22,000; owner, James Monteith, St. Nicholas Ave., cor. One Hundred and Fifty-fourth St.; architect, Wm. M. Grinnell; builders, Wm. Cowen and Jas. Pettit.

Philadelphia.

BUILDING PERMITS.—*Passyunk Ave.*, s e cor. Rope Ferry Road, two-st'y dwell., 25′ x 35′; Thos. Gruman.

Wilder St., w of Nineteenth St., 5 two-st'y dwells., 15′ x 49′; M. B. Stackhouse, owner.

Westminster Ave., w of Forty-second St., 5 two-st'y dwells., 14′ x 33′; J. R. Pyle, contractor.

Filbert St., w of Eighth St., five-st'y store, 50′ x 145′.

East St., cor. Terrace St., 4 two-st'y dwells., 16′ x 32′, and three-st'y dwell. and store, 22′ x 34′; A. Laubenstein, owner.

North Sixth St., No. 40, four-st'y brick building, 18′ x 45′; Morris & Wickersham.

Paul St., n of Orthodox St., two-st'y dwell., 16′ x 42′; Chas. E. Deal, contractor.

Kensington Ave., n of Adams St., two-st'y store and dwell., 17′ x 60′; Jos. Miller, contractor.

Dillwyn St., No. 350, two-st'y machine-shop, 20′ x 70′; Joseph Blochlinger, contractor.

Lancaster Ave., cor. Westminster Ave., three-st'y store and dwell., 20′ x 48′; Geo. Kehoe, owner.

Sixty-fifth St., cor. Hamilton St., two-st'y dwell., 30′ x 34′; Rev. J. G. Brown, rector.

School Lane, between Pulaski Ave. and Township Line, two-st'y dwell., 24′ x 48′; Geo. Hearst, contractor.

Hick St., between —— and Dickinson Sts., 38 two-st'y dwells., 14′ x 38′; also, *Fifteenth St.*, s of Dickinson St., 6 three-st'y dwells., 14′ x 50′; also, on *Dickinson St.*, w of Fifteenth St., 8 three-st'y dwells.; also, *Hick St.*, s of Dickinson, 6 two-st'y dwells., 14′ x 38′; W. R. Matchett, owner.

Jefferson St., cor. Mansion Ave., three-st'y dwell., 18′ x 48′; Geo. Stanley, owner.

Haines St., opposite Cedar Lane, three-st'y dwell., 18′ x 34′; J. J. Schuler, contractor.

Kensington Ave., Nos. 2544 *and* 2546, 2 three-st'y stores and dwells., 20′ x 58′ and 22′ x 58′; W. Kane, owner.

Colona St., e of Twelfth St., 2 two-st'y dwells., 16′ x 42′; John Klebe.

Richmond St., No. 313, three-st'y brick building, 15′ x 60′; C. G. Harris, contractor.

Edward St., between Second and Hancock Sts., 2 four-st'y factory-buildings, 46′ x 56′ and 60′ x 76′; Jno. A. Ebert, owner.

Fifth St., w s, n of Cambria St., 2 two-st'y dwells., 18′ x 42′; E. C. Sheppard, contractor.

North] Fifth St., No. 958, three-st'y dwell., 18′ x 62′; H. M. Martin, contractor.

Jefferson St., s s, w of Mansion Ave., three-st'y dwell., 18′ x 48′; McIlvain & Cunningham.

York Road, e s, between Green Lane and Branchtown, two-st'y dwell., 14′ x 30′; D. J. Mott, owner.

Filbert St., No. 3426, two-st'y dwell., 15′ x 45′; H. C. & A. R. McIlvain, owners.

Long Lane, e s, s of Reed St., 6 two-st'y dwells., 16′ x 20′; Robt. McFarland, owner.

Thirty-seventh St., cor. Elm St., 7 three-st'y dwells., 15′ x 45′; Wm. J. Shedwick & Bros., owners.

Arrot St., s e cor. Franklin St., three-st'y dwell., 18′ x 34′; Jno. C. Haines, contractor.

Dudley St., s s, between Seventh and Eighth Sts., 6 two-st'y dwells., 14′ x 28′; also, *Eighth St.*, s e cor. Mercy St., 3 two-st'y dwells., one with store; 16′ x 42′; J. C. D. Smith, owner.

St. Louis.

Wm. Moore, frame dwell.; cost, $7,000; Joseph E. Truitt, contractor.

Gen. W. T. Sherman, brick dwell.; cost, $2,500; Cameron, architect and contractor.

S. Prag, brick tenement; cost, $3,200; A. Deitz, architect and contractor.

Henry Schoenweisz, brick dwell.; cost, $3,600; Beekmeier & Rieckman, contractors.

R. W. Golson, brick dwell.; cost, $10,000; Johnson, architect; Henry Roach, contractor.

Joseph Rolfmeyer, brick dwell.; cost, $5,000; John H. Frye, architect and contractor.

Nicholas Ast, brick dwell.; cost, $3,665; Schilling, architect; Hermann & Schumacher, contractors.

Clara E. Martin, brick dwell.; cost, $2,800; J. E. Twitt, architect and contractor.

Wm. Schoenlan, brick dwell.; cost, $15,000; Paulus & Weidemuller, contractors.

Louis Haeger, brick dwell.; cost, $3,800; F. W. Dette, architect; John Boehler, contractor.

Wm. Marshal, brick dwell.; cost, $3,700; Twitt, architect and contractor.

Wm. Ruhland, brick tenement; cost, $12,000; Berk, architect; Haeseler & Lewis, contractors.

Geo. Millinger, brick tenement; cost, $3,075; Hammer & Puhl, contractors.

Ada V. Churchill, brick dwell.; cost, $5,000; C. B. Clarke, architect.

Isaac H. Walker, brick stores; cost, $10,000; W. M. Walker, architect.

J. J. Carroll, brick dwell.; cost, $2,500; Bradshaw, contractor.

Mrs. Lucy M. Brown, brick dwell.; cost, $11,000; E. Mortimer, architect; J. V. Majors, contractor.

German School Association, brick school; cost, $9,000; C. E. May, architect; C. L. Salomon, contractor.

M. H. Earle, brick dwell.; cost, $5,000; Earle, architect and contractor.

T. S. Paterson, brick dwell.; cost, $2,500; Paterson, architect and contractor.

Dr. John Green, brick office; cost, $4,000; Thomas Young, architect; Milburn & Rich, contractors.

T. Toensfeldt, brick school; cost, $6,500; Gosseling, architect; Henry Hagan, contractor.

Peter Wertz, brick dwell.; cost, $2,700; Wertz, architect and contractor.

Dr. H. Nagel, brick dwell.; cost, $6,800; Raeder, architect; S. F. Hoffmann, contractor.

Johanna Carpenter, brick dwell.; cost, $10,200; Goesse, architect; Goesse & Remmers, contractors.

Caspar Stolle, brick warehouse; cost, $8,000; Berke, architect; Stolle, contractor.

D. McCarthy, tenements; cost, $3,500; B. Carley architect and contractor.

J. Dollis, tenements; cost, $5,600; Koenig, architect; J. Weis, contractor.

J. & J. Francis, tenement; cost, $4,000; S. V. Clark, architect and contractor.

T. McCormack, store and rooms; cost, $7,500; Meagher, architect; J. Waters, contractor.

W. Brown, dwell.; cost, $3,600; Eisemann, architect; J. D. Fitzgibbon, contractor.

J. J. O'Brien, dwell.; cost, $6,000; S. H. Hoffmann, architect and contractor.

W. M. Hall, dwell.; cost, $3,200.

F. Megher, dwell.; cost, $6,500; C. Chapman, contractor.

J. H. Dellehay, tenements; cost, $3,750; C. L. Aufderheide, architect and contractor.

H. Dierker, store and dwell.; cost, $3,300; A. Wieden, architect and contractor.

J. J. Tilfort, store and dwell.; cost, $5,000; W. C. Schaper, architect; F. W. Leffhagen, contractor.

J. P. Gleeson, dwell.; cost, $4,500; J. A. Conlon, architect and contractor.

J. H. Maurice, dwell.; cost, $8,000; J. H. Maurice, architect and contractor.

J. H. Maurice, dwell.; cost, $8,000; J. H. Maurice, architect and contractor.

B. Rust, tenements; cost, $5,000; H. Ellermann, architect and contractor.

C. Stephens, dwell.; cost, $4,300; Helm Bros., architects; H. Ellermann, contractor.

D. Evans & Bro., dwell.; cost, $3,000; Mortimer, architect; D. Evans & Bro., contractors.

M. McGrath, dwell.; cost, $3,000; Furlong, architect; M. McGrath, contractor.

Toledo.

OFFICE-BUILDING.—Five stories and basement, St. Clair St.; cost, about $60,000; Messrs. Carrington & Cummings, owners; N. B. Bacon, architect; E. Malone, builder.

STORES.—Brick business building, four stories and basement, St. Clair St., cor. Jefferson St.; cost, about $20,000; Estate of E. Walbridge, owners; N. B. Bacon, architect; E. Malone, builder.

HOUSES.—Two-st'y frame dwell., Nineteenth St., for Mr. Dorr; cost, about $3,500; E. O. Fallis, architect; M. A. Stegenga, builder.

Two-st'y frame residence and stable, Jefferson St.; cost, about $5,500; Mrs. A. M. C. Barnes, owner; N. B. Bacon, architect; Jno. W. Leo, builder.

Two blocks, comprising four frame dwells., two stories, Jefferson St., near Twenty-first St.; A. B. Waite, owner; Jno. Kerruish, builder.

Two-st'y frame residence, Ashland Ave.; cost, about $4,000; Rev. Mr. Toensmeir, owner; N. B. Bacon, architect.

Two-st'y frame residence, Lincoln St.; cost, about $2,600; C. L. Smith, owner; N. B. Bacon, architect.

SOLDIERS' MEMORIAL BUILDING.—Brick and stone, three stories, Adams St., cor. Ontario St.; Gibbs & Stine, architects. Corner-stone laid July 4, 1883.

CLUB-HOUSE.—Additions to Draconian Club Building, Superior St.; cost, about $2,500; N. B. Bacon, architect; Jno. Kerruish, builder.

SCHOOL-HOUSES.—Two ward school-buildings, brick, two stories; cost, about $15,000; Gibbs & Stine, architects; A. Bentley and Dawson & Anderson, builders.

Washington.

STABLE.—The Union Transfer Co. is about to build a stable from plans by Wilson & Brothers, architects, Philadelphia.

BUILDING PERMITS.—Three-st'y brick dwell. on Connecticut Ave., bet. M and N Sts., for C. E. Hawley; cost, $12,000; Gray & Page, architects; W. J. Kenendine, builder.

Three-st'y brick and stone dwell., in county, for E. Berliner; cost, $10,000; C. A. Didden, architect.

Three-st'y brick dwell. on Twentieth St., bet. M and N Sts., for F. J. Lippetts; cost, $8,000; Gray & Page, architects; W. J. Kenendine, builder.

Five two-st'y brick dwells. on Corcoran St., bet. Fourteenth and Fifteenth Sts., n w, for D. A. Winson; cost, $15,000; Chas. Cole, architect.

Three-st'y brick safe deposit building on Pennsylvania Ave., bet. Ninth and Tenth Sts., n w, for Washington Safe Deposit Co.; cost, $50,000.

Three-st'y brick dwell. on Jefferson St., for Mrs. E. W. Lippett; cost, $7,000; Gray & Page, architects; Bright, Humphrey & Co., builders.

Two four-st'y brick dwells. on Connecticut Ave., bet. H and I Sts., n w, for C. Edmonston, agent; cost, $14,000.

Three-st'y brick dwell. on Connecticut Ave., near N St., n w, for D. L. Yulee; cost, $40,000; C. H. Reed, Jr., architect.

Two-st'y frame dwell. in the county, for S. W. Saxton; cost, $4,000.

Four-st'y brick dwell. on B St., near First St., n w, for J. F. Farnsworth; cost, $9,500; J. Germuiler, architect.

Three-st'y brick dwell. on Sixteenth St., near Scott Circle, for J. A. Cormody; cost, $6,000; W. M. Poindexter, architect.

Two three-st'y brick stores on Ninth St., bet. D and E Sts., n w, for Ed. Temple; cost, $17,000; Wm. Price, builder.

Three-st'y brick dwell. on M. St., bet. Tenth and Eleventh Sts., n w, for M. L. Boarman; cost, $6,300; Wm. Price, builder.

Four-st'y brick dwell. cor. Nineteenth and G Sts., to be known as the "Lenthal Home;" cost, $20,000; W. M. Poindexter, architect; R. L. Parry, builder.

Four-st'y brick dwell. on Connecticut Ave., bet. M and N Sts., n w, for David King; cost, $28,000; R. I. Fleming, builder.

Four-st'y brick dwell. on N St., bet. Nineteenth and Twentieth Sts., n w, for Mrs. C. V. English; cost, $6,000; C. A. Didden, architect; G. W. Rae, builder.

Two-st'y brick store and dwell. cor. Eleventh and B Sts., n e; cost, $4,600; S. J. King, builder.

General Notes.

ACKLEY, IO.—F. D. Hyde, architect, Dubuque, Io., is preparing the plans for a one-st'y frame school building, 26′ x 42′, for the primary department; to cost about $1,500.

ATHOL, MASS.—George H. Cooke is soon to build two houses on the corner of School and High Sts. The building interests in town are very extensive this spring, among the projectors being Calvin Miller, George Bishop, Orin Lamb, Frederick Cheney, C. W. Woodward, O. F. Amsdems, and W. W. Fish.

ATTLEBORO', MASS.—Ground has been broken for the new Catholic church, 50′ x 90′.

AUBURN, R. I.—A Free Baptist church is building here.

BABYLON, L. I.—Wm. H. Beers, architect, of New York, is building a house for J. M. Bergen, Esq., of Brooklyn; cost, $12,000.

BAY SHORE, L. I.—A large stable to cost about $6,000, is to be built for Mr. B. Phelps, from designs of Mr. C. C. Buck, of New York.

BELCHERTOWN, MASS.—D. P. Clapp and K. L. Clapp are making additions and alterations to their houses, at a cost of about $18,000.

A hotel for a lot on Main St., at the southern end of the park, to contain sixty rooms, and to cost $50,000; H. F. Kilburn, architect, New York.

BELLOWS FALLS, VT.—The Selectmen are authorized to build a town-house, to cost, with site, $12,500.

BISMARCK, DAK. TER.—The competition for plans for the penitentiary closed May 30.

BRIDGEPORT, CONN.—E. Parmly, two-st'y frame dwell., Park Ave.; cost, $12,000; W. R. Briggs, architect.

The Methodists at Washington Park, E. D., are erecting a brick church from plans by L. B. Valk, New York; Rutherford & Spargo, builders.

The excavations for the Bridgeport Hospital have been commenced on Old Mill Hill. $100,000 is now at command for the work; Lambert & Bunnell, architects.

Dr. Warner and E. C. Bassick are building twenty-five workmen's cottages, from plans by H. A. Lambert, architect.

C. Hawley, 9 houses of frame, in blocks, on Lafayette St.; cost, $2,000 each; A. A. Skaats, architect.

G. E. Hobbs, a pair of frame houses on Seeley St.; cost, $7,000; G. E. Potter, architect.

M. A. Daly, two houses on Railroad Ave.; cost, $5,000; Palliser, Palliser & Co., architects.

BROCKTON, MASS.—The Herbert & Rapp Elastic Fabric Company will put up three one-st'y buildings, each 44′ x 160′.

BRYN MAWR, PA.—Stone house for Dr. W. C. Powell; Wilson Brothers & Co., architects, Philadelphia.

BUFFALO, N. Y.—J. C. Kingston is erecting a five-st'y brick last factory, 70′ x 100′.

CAMBRIDGE, MD.—Christ P. E. Church, stone, 74′ x 88′ 8″, style, Gothic, seating capacity 500; cost, $15,000, exclusive of pews, etc.; Chas. E. Cassell, architect, Baltimore.

CAMDEN, N. J.—Alterations to North Baptist Church; Wilson Bros. & Co., architects, Philadelphia.

CANANDAIGUA, N. Y.—A large brick house for J. A. McKechnie, Esq.; house to cost $40,000; façade of cut stone, terra-cotta and brick; Jas. G. Cutler, architect, Rochester; Hugh King, contractor.

CLEARFIELD, PA.—D. W. McCurdy, two-st'y brick house, cost, $5,000.

DETROIT, MICH.—A large brick dwelling-house for Mr. B. B. Mitchell, cor. Delaware and Woodward Aves.; to cost, $10,000; brick barn for the above to cost $3,000; Jas. G. Cutler, architect, Rochester, N. Y.; G. L. Thomas, contractor.

DUBUQUE, IO.—Thos. Ryan, Esq., is to build a three-st'y brick building, 32′ x 75′, for stores and flats, on Iowa St., near City Hall; cost, $8,000.

The Paint Works Co. has begun a three-st'y brick building, 30′ x 100′, at corner of Jackson and Tenth Sts., for mill and warehouse; cost, about $6,000.

James Howie, Esq., will begin a block of six three-st'y brick houses, on Seventeenth St., near Locust St., as soon as the plans are ready; cost, about $15,000.

F. D. Hyde, architect, furnishes plans for the above work.

ELYRIA, O.—Frame dwell. for L. McLean; cost, $6,000; F. H. Norton, architect, Cleveland, O.

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CONTENTS.

THE investigation at Washington drags along, the accusing party being apparently waiting for something to turn up in the shape of a plausible pretext for a new charge. The committee of investigation evidently regards evidence founded upon newspaper reports of pretended interviews with discontented persons with about the same favor that it would receive from other fair-minded persons, and there is little probability that any action will be taken reflecting upon the integrity of the present Supervising Architect. At the same time it has become sufficiently evident that the building affairs of the United States, unlike a manufacturing business, cannot be advantageously or economically carried on by a vast central bureau. Even leaving out of the question the artistic consideration, the mere administration of the expenditure upon a costly building requires, to secure strict economy, a personal attention to little details on the part of its designer, the place of which cannot be supplied by the care of a deputy, however competent. It is said that twenty thousand letters are sent out every year from the office of the Government Architect. Obviously, no one man can keep in his mind the particulars of so vast a business as this correspondence implies; and yet, as every architect knows, without such minute familiarity with work in progress, opportunities for saving in extras, and economies of various kinds, which often amount to a considerable percentage on the total cost of a building, must be lost. We do not agree with those who think that the Government ought to sacrifice the public money merely for the sake of employing private architects; but now that the experiment of economizing in the public expenditure by dispensing with the usual professional assistance in the construction of Government buildings has been fairly tried, we should like to know if the result has proved this system to be greatly superior to the old one, still followed in other portions of the civilized world, of openly entrusting the design and supervision of public buildings to those who show themselves most capable of carrying them out with credit to themselves and their country.

A SOMEWHAT remarkable meeting was held in New York two weeks ago, under the name of the First National Convention of Master Plumbers, which was composed of delegates from nearly all parts of the United States, and probably represented pretty fairly the whole plumbing trade. The proceedings of the Convention, therefore, must be regarded as illustrating the habitual thoughts and opinions of plumbers, and we are obliged to say that our respect for the trade has not been increased by the exhibition. The very first task of the Convention, after the nomination of officers, was to make a totally uncalled-for assault upon the members of a profession to which the business of plumbing owes, perhaps, most of its present prosperity, by means of a document, read and "spread upon the minutes of the Convention," in which "the old-time, steady and conservative plumber" was compared, much to his advantage, with the "new excrescence on the body politic," known as the sanitary engineer. The rage against these "excrescences," who are called in other portions of the official document "magniloquent braggarts," "book-taught experts," and "newspaper scientists," seems to have been excited by the fact that "the unlucky plumber is relegated to the humble position of the mere fitter-up of whatever fantastic ideas or notions have been evolved from the brain of the sanitary expert;" and the "emphatic condemnation" of the Convention was expressed against "this abuse."

WE have no desire to malign the plumbers, for whom, as a class, no one can have a greater regard than ourselves, but it ought not to be necessary to point out that such attacks upon professional sanitarians, some of the best of whom, indeed, are, or have been, themselves plumbers, only discredit those who make them. Why was it, we should like to ask, that in thirty years of the practice of house-drainage by the "steady and conservative" plumbers, the art steadily degenerated, so that in nearly every respect the best plumbing of the year 1870, let us say, was inferior to that of 1840? Why was it, again, that about thirteen years ago a movement began which has already revolutionized the art, and has made the plumbing work of the day as much superior to that of forty years ago as that was to the foul tinkering of the last decade? How does the Master Plumbers' Convention account for the fact that the beginning of this modern reform, the most important movement of the present generation, was contemporaneous with the appearance among professional men of certain individuals who came to be known afterwards as "sanitarians," or sanitary engineers? Or for the other fact, that most of the best improvements in drainage appliances have been made either at the suggestion or in accordance with the direction of "book-taught experts," and have forced their way into use against the stolid resistance of nearly the whole plumbing trade, by the unceasing efforts of the "magniloquent braggarts," directed, not to the hopeless task of arguing with "practical skill and experience," but to the little less difficult enterprise of "pandering to the popular prejudice" in favor of clean and wholesome living?

THE fever for living in apartment-houses has not yet affected the whole community of New York, and two or three gentlemen have lately made some endeavor to counteract it by undertaking to build small houses in such a locality, and of such plan and external appearance, that people of education and taste can not only endure to live in them, but may, notwithstanding their small size and unpretentious character, even take pride and pleasure in occupying them. Until within a few years, as every one knows, a man with a family and an income of less than seven or eight dollars a day was obliged, if he desired to live in New York, either to board, or to hire a floor in some house planned without reference to such use, cramming his children and himself into the rooms as best he could. If he attained a somewhat improved financial position, and aspired to a house of his own, he was obliged to choose among rows of hideous habitations, varying in design only between helpless shabbiness and tawdry vulgarity. The fashion of apartment-houses brought a certain relief from this, and it became possible for a man, by coöperation with others, to secure a home in a part of a building designed with some appreciation of healthfulness, character and interest. The other alternative, of abandoning a cheap and ugly dwelling for an equally cheap but beautiful one, has only recently been presented to the modest householder, but the result has been most encouraging, and we may hope that the fashion will spread rapidly. So far as private houses are concerned, New York is architecturally perhaps the most uninteresting city in the world. It is quite time that this should be changed, and there is reason to suppose that if the example is once set, the demand for picturesqueness and expression in domestic building will soon make itself strongly and widely felt.

AN interesting experiment in education is in progress in New York, where a Workingman's School, intended, not for grown persons, but for children who expect to gain their living by manual labor, is now in successful operation. The children are received into the infant department of the school at a very early age, and trained under the kindergarten system, graduating from this department into a little workshop, where each pupil is furnished with a ruler and triangle, and set at work to draw an elevation of a house, from a model placed in view of the class. After drawing the square, surmounted by a triangle, which represents the gable end of the house, the

pupils are given pieces of moist clay, on which they lay out the same figures, by means of rule and try-square, and cut them to the form with wooden tools. As the children advance in age and capacity, they are allowed to use drawing-boards, T-squares, scales and compasses, reproducing as solids the forms which they draw on paper, by modelling them in clay or pasteboard. The clay, which is shaped by the hand, or with wooden tools, is exclusively used by the young children, who could not safely be trusted with sharp steel, but saws and chisels are added afterwards. Simultaneously with these manual exercises are given lessons in reading and writing, arithmetic and geography. With true charity, the little ones, instead of being abandoned to themselves during the summer vacation, have, in each of the two years since the school was established, been taken to spend two weeks on a farm in the country, where they are shown how to interest themselves in natural objects, and gain at once mental, moral and physical vigor for their next year's work. The influence of such school training as this upon the susceptible bodies and minds of young children must be of incalculable value, and it is only to be regretted that its advantages should be confined to so few, only one hundred and fifty being as yet provided for. We wish that every one who has money to spare, and the disposition to do some good with it, would study by actual observation the influence upon the character of the young of the depressing air, the foul sights and smells, the vicious associations, and the capricious discipline of the homes in which two-thirds of the next generation of New Yorkers are now being brought up, and compare these with the bright, sweet atmosphere of a good school for little children, with its gentle but steady control, wholesome surroundings, and varied but pleasant industry. If the benevolent community could once be brought to realize the dependence, for the formation of habits and modes of thought which will last them through life, of young children upon the external circumstances and influences which surround them, we should soon see all these little ones made the objects of the most anxious solicitude, kept through school-hours as protracted as possible under the best of care, and watched over even at home by special guardians; refreshed with pure country air at regular intervals, and attended in sickness by tender and skilful nurses. Such charity as this would be indeed worth its cost; and if each of the next half-dozen persons who think of endowing colleges to teach a thousand rich young men to read Greek will devote his funds instead to the maintenance of schools for giving ten times that number of little children a good start on the way of health and happiness, he will find the latter form of benevolence the less expensive of the two, and its rewards greater.

THE present year is to be marked by the commencement of work on two statues, which promise to be of considerable importance, — that of President Garfield, by J. Q. A. Ward, and of General Burnside, by Launt Thompson. It is some time since the latter artist has been called upon for any ambitious public work, and, indeed, the present commission promises to give him the best opportunity he has had for winning that permanent fame which even the highest degree of refined skill, devoted to private work, seldom gains for a sculptor. As it happens, Mr. Thompson is now engaged upon another statue, that of Admiral Dupont, which will in Washington, like the Burnside statue in Providence, have the benefit of being seen by a much larger number of persons than most of his previous work. Mr. Ward's commission comes, we believe, at the same time with that for the statue of Washington to be erected upon the steps of the Sub-Treasury in Wall Street. If that project is really to be carried through, Mr. Ward may congratulate himself upon having at once two opportunities such as fall to few sculptors more than half-a-dozen times in their lives.

LE GENIE CIVIL contains a description of the Suez Canal, by an engineer familiar with the work, which gives some interesting particulars of the management of the canal, and the present condition of the construction. It need hardly be said that the vast trench, cut in fine and shifting sand, needs constant dredging, while the banks are continually falling in at different points, and need revetment and repairs. The most common source of injury to the banks is the agitation of the water caused by the "swell" which follows the movement of large vessels through it. The width of the main channel of the canal being only about one hundred and fifty feet, the passage of a steamer of three or four thousand tons measurement displaces an immense volume of water, which closes in again behind it in the form of a wave of considerable height, and capable, as engineers know well, of exerting a very serious effect upon the margin, even of a canal in hard ground. To this cause of erosion is to be added the violent abrasion of vessels, which are frequently driven against the shore by bad steering or unfavorable winds, in spite of the greatest care. To guard against all these, the sides of the canal are now being rapidly revetted with stone blocks laid in mortar, which, so far as the work is completed, effectually prevent further decay. A certain amount of sand, however, blows into the canal from the surrounding desert, filling it up in some places at the rate of three or four inches a year, and although the banks are so shaped as to intercept much of the deposit, enough reaches the water to make it necessary to dredge it out occasionally. Attempts have been made to establish some sort of vegetation by the sides of the canal, both for giving firmness to the banks by their interlacing roots, and as a barrier against the dust-clouds, but the cost of bringing the fresh water necessary in that rainless climate for keeping any kind of plant alive, is so great that little progress has been made.

THE system of regulating the transit of vessels through the Canal is the result of long experience and close observation. In order to avoid collisions, all movement of ships during the night is forbidden, except in cases of great necessity, and then only upon the condition that the commander of the ship shall sign a contract absolving the Canal Company from all responsibility for accidents. The speed of vessels is restricted to a maximum of six and one-half miles per hour, and at Suez, where strong currents are caused in the canal by the tides of the Red Sea, entrance is permitted only at suitable hours. Once in the canal, the vessel steers between two lines of buoys, about five hundred feet apart, and indicating a deep-water channel one hundred and thirty feet wide. A telegraph runs along the bank, and at each turn-out station is a signal pole, from which each pilot learns whether he must anchor and wait for a vessel coming in the opposite direction, or may advance to the next station. In the former case the pilot steers to the side allotted to those going in the same direction as himself, and sends boats ashore with hawsers, which, by the aid of the company's employés on the bank, are secured to great posts set in the sand. The turn-out basin is wide enough for three rows of the largest ships, so that a sufficient passage is left for those having the right of way between the others moored at each side. In order to admit of ready landing from boats at any point, the whole length of the canal is bordered on each side by a strip of shallow water from twenty to one hundred feet wide, according to the character of the ground, which has a bank in the form of a shelving beach, up which boats are easily drawn. The number of craft now passing through the canal is so great that the turn-outs are often occupied by ten or fifteen ships at a time, waiting their turn to proceed, and the time required for making the entire transit of a little more than one hundred miles has increased from the fifteen or sixteen hours needed at first, when the way was generally clear, to three, four, and even five days. It is rather remarkable that, aside from the injury which they cause to the banks, the largest steamers pass most safely and easily through the canal; their great length helping to keep them steadily pointed in the proper direction, while smaller vessels are blown or swung around, and come in contact with the banks.

THE subject of the new Suez Canal seems to cause a good deal of agitation both in England and France. The English Government, with what would appear to be a judicious regard to the circumstances of the case, recently entered into an agreement with M. de Lesseps, under which the latter, or rather, the company which he represents, undertook to construct a new canal, parallel with the first; and in return for this the English Government promised to make the Canal Company a loan of some forty millions of dollars, for fifty years, at three and one-half per cent interest, and also to exert its influence in obtaining a new concession of land from the Viceroy of Egypt. Unfortunately, the constitution of the English Government is such as to tempt politicians into rather unreasonable conduct about such matters, and the agreement has been violently denounced by all those who had no hand in making it, and may perhaps be abandoned altogether.

WATER-CLOSETS.[1] — XV.

The Gale Closet. — Among other closets manufactured by A. G. Myers, of New York, which belong to this class and type, is one invented by M. F. Gale, in 1880. The peculiarity in this closet consists in the arrangements for the overflow, and for washing the plunger-chamber. The overflow is through an upright pipe, while the float which governs the supply is in the form of a cylindrical cup slightly enlarged, and closed at one end, and it is placed with its open end downward over the overflow-pipe. In this manner a water-trap is formed between the plunger-chamber and the soil-pipe. The float is connected with the supply-valve by a crooked lever, while its chamber is separated from the plunger-compartment by means of a perforated partition. The overflow is again trapped by dipping into a small box of water, before it enters the soil-pipe. The plunger-chamber has a small pipe connected with the supply-pipe encircling it, around the circumference of which are a row of small holes, through which small jets of water are thrown over different parts of the plunger-chamber. In this manner it is proposed to keep this part of the closet clean. The bowl of this closet is porcelain, while the iron parts are all enamelled and are connected with the bowl by means of set-screws.

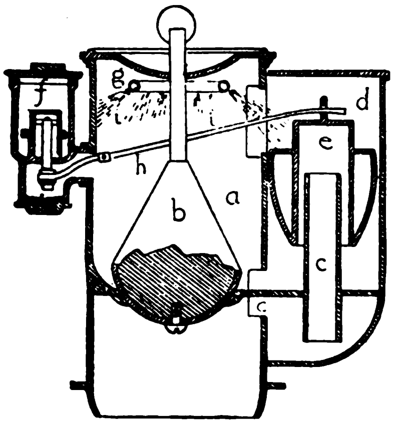

Fig. 152.

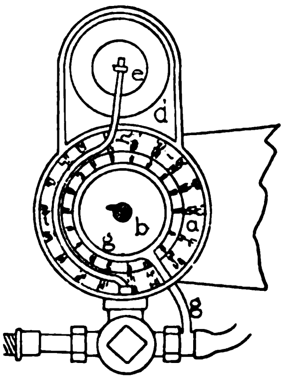

Fig. 153.

The Gale Closet.

Section and top view of Plunger-Chamber.

a, Plunger-chamber. *b*, Plunger. *c*, Overflow. *d*, Float-chamber. *e*, Float governing supply-valve. *f*, Supply-valve. *g*, Sprinkler for washing plunger-chamber. *h*, Lever connecting float and supply-valve. *i*, Small jets of water.

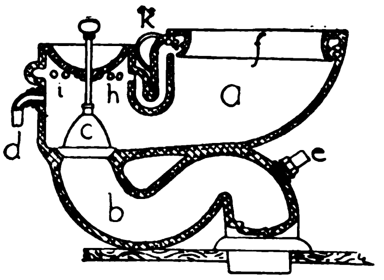

Fig. 154. — Section. — Myers's All China Closet.

a, Bowl. *b*, Trap. *c*, Plunger. *d*, Overflow. *e*, Vent-pipe coupling. *f*, Flushing-rim. *h*, Plunger-chamber. *i*, Holes for letting water into plunger-chamber. *k*, Supply-pipe.

Myers's "All China" Closet. — The same firm manufactured a solid plunger-closet invented in 1881. "This closet has an independent overflow, a solid plunger, and a flushing-rim with patent jagged points, causing the water to form a cataract. . . . There is also an encircling chamber" around the plunger-compartment, which would throw jets of water in all directions, crossing each other, probably washing a chamber of this kind as effectually as any contrivance of the kind could. The overflow does not enter the soil-pipe, but is intended either to empty into the safe, or it may be carried through the wall, and empty on the outside of the house. The trap has a brass coupling inserted at its crown, to which a vent-pipe may be soldered. An opening for a vent-pipe should at the least be two inches in diameter. The same closet is supplied with a simple offset instead of a trap.

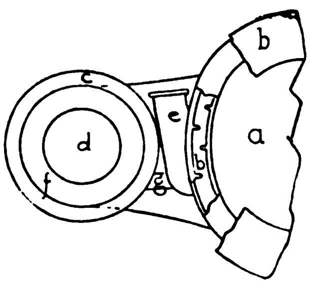

Fig. 155.

Flushing-Rim, All China Closet.

a, Bowl. *b*, Flushing-rim on bowl. *c*, Flushing-circle for plunger-chamber. *d*, Plunger. *f*, Plunger-compartment. *e*, Supply. *g*, Connection between the two flushing-rims.

Myers also manufactures the "Egg Oval" Closet; the peculiarity of which consists in the shape of the outlet from the bowl. This outlet in cross section is egg-shaped.

Moore's Closet. — A solid-plunger closet was invented in 1881, by C. H. Moore, of Philadelphia, Penn. This closet is made in one piece of earthenware, and the novelty consists in the float being so arranged that when the water falls to a certain point in the bowl and plunger-chamber, the closet is flushed from the tank. The float in falling, pulls down the long arm of a lever that is bolted to it. The short arm of this lever is connected with a long upright rod, and the head of this rod projects up into the tank, where it forms a valve which governs the supply to the closet. The necessity for an overflow in this closet is obviated by an enlargement of the arm of the plunger; this enlargement being too great to pass through the float, the plunger would be necessarily lifted from its seat, when the water had risen above a certain height.

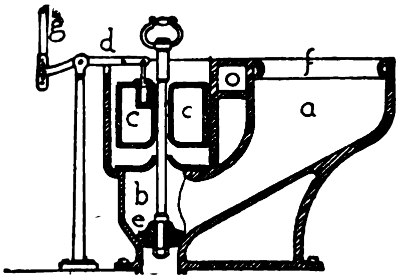

Fig. 156. — Moore's Plunger-Closet.

a, Bowl. *b*, Plunger-chamber. *c*, Float. *d*, Lever. *f*, Flushing-rim. *e*, Plunger. *g*, Rod connecting with tank.

Milne and Gaut's Closet. — In 1880, letters patent were issued to Milne and Gaut, of San Francisco, for a solid-plunger closet. This closet has plunger and float chambers, just large enough for the plunger and float to move up and down in them, and they are connected with each other only by small openings. The overflow in this closet rises from the top of the float-chamber, just below the top of the bowl, and enters the offset before it joins the soil-pipe. Although the compartments, as in the Ingleton Closet (Fig. 147), are simply large enough for the purpose they are intended to serve, still the small conduits connecting them would make the scouring and cleaning received from the water passing through it even less effectual than if everything were contained in one large compartment.

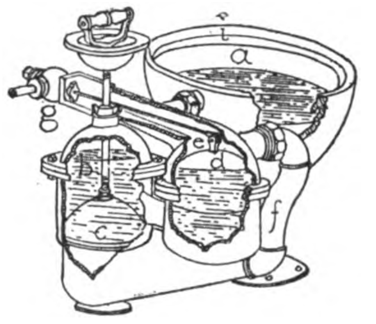

Fig. 157. — Milne & Gaut's Closet.

a, Bowl. *b*, Plunger-chamber. *c*, Plunger. *e*, Float governing the supply-valve. *g*, Supply-valve. *f*, Overflow. *i*, Flushing-rim.

Budde's Closet. — A plunger-closet was invented in this country, in 1882, by J. Budde. The arrangement of the mechanical valve in the overflow is the new feature of this closet. The overflow is through a tube attached to, and parallel with the plunger-chamber. At the bottom of the overflow there is a ball-valve; this ball is connected by a rod with a hinged float, that covers the top of the plunger-chamber; when the water rises to the top of this chamber, it fills the overflow, raises the valve by means of the float, and passes into the soil-pipe. Neilson, 1873; Gilchrist, 1874; Keyser, 1876; Moellmann, 1882, invented slight and unimportant improvements either in the form and position of the overflow or supply-valve, in connection with which each used a plain solid plunger.

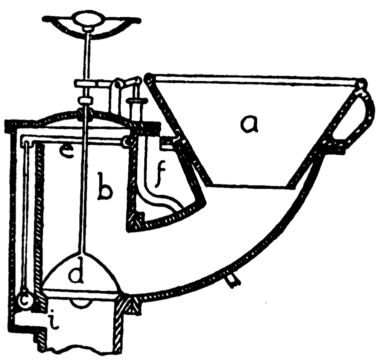

Fig. 158. — Budde's Closet.

a, Bowl. *b*, Plunger-chamber. *c*, Ball-valve in overflow. *d*, Plunger. *e*, Float for overflow. *f*, Supply-pipe. *h*, Supply-valve. *i*, Overflow.

E. S. Hutchinson's Closet has the plug in the same compartment that forms the bowl, in this respect being similar to closets that were in use more than one hundred years ago.

DEDUCTIONS.

It will have been noticed by those who have read the foregoing descriptions, that the mechanical faults and the sanitary objections to the plunger-closet are almost identical to those mentioned in connection with valve-closets. The utility of the plunger in a closet of this class depends upon its taking a water-tight seat. All the useful plunger-closets have a rubber flange or ring around the bottom of the plunger, and this form of plunger is generally effective, as long as the vulcanized rubber retains its elasticity; when it gets hard the plumber must be called in to put on a new one.

This form of closet is liable at any time to lose the water in the bowl and plunger-chamber, by foreign matter lodging between the plunger and its seat; so it is never safe to have a closet of this kind connected to the soil-pipe without a trap; although the patentees usually claim it as one of the advantages of their closet, that it does not need a trap between it and the soil-pipe. The plunger takes and retains its seat by the action of gravity, and for this reason it is more simple, and a better mechanical device than the valve; requiring no levers, weights, or cranks to operate it, or keep it in position.

It is necessary for a plunger to be heavy, so it can take and keep its seat properly; this weight is often a decided inconvenience and objection where the closet is to be constantly used by delicate women and small children.

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[1] Continued from page 15, No. 394.

Taking a sanitary view of the subject, the greater number of the different patterns of plunger-closets should be considered inferior to the valve-closets, the plunger-chamber being — as with a few exceptions it is — larger than the receiver of a valve-closet, and containing the plunger, float, lever, and frequently the supply-valve, upon the different surfaces of which filthy matter is liable to collect and decay.

Mr. E. S. Philbrick says of closets belonging to this class, "The construction of these (supply) valves is various, and their action is not always reliable, which has at times caused considerable annoyance. If these valves can be made more certain in their action, and the float-chamber made more accessible for frequent cleaning, the apparatus can be made a very satisfactory one; but it needs careful treatment and good care."[1]

The supply-valves not being reliable, closets of this class must have overflows.

Where the plunger is hollow, the overflow is carried off through the plunger, but where the plunger is solid, a separate conduit has to be provided: and where this is trapped by a water-seal, the water is liable to be drawn from the trap by siphon action, whenever the closet is used. To prevent this siphon action, a vent must be coupled to the closet, somewhere between the seat of the plunger and the point where the closet is connected with the soil-pipe.

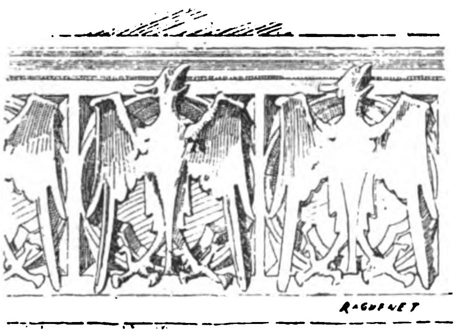
If the closet is connected with the soil-pipe without the intervention of a siphon-trap, the breaking of the seal in the overflow would put the occupants of the house in direct communication with the soil-pipe, as the covers to the plunger-chamber are not intended to have their joints air-tight, except in one or two instances. In selecting a closet of this class, care should be taken to get one with a plunger-chamber at least enamelled, while a bowl and plunger-chamber in one piece of earthenware is the best. The mechanism should be simple, the plunger-chamber small, and with a top or cover that can be easily removed.

The closet should be supplied with water from a cistern or tank, and should be admitted to the bowl through a flushing-rim. There should be a branch-supply for washing the plunger-compartment and plunger, admitted through a ring or sprinkler.

A hollow plunger simplifies the question of the overflow. It is necessary for the plunger to have a vulcanized-rubber ring or flange around its bottom.

The closet must have a siphon-trap under it, with a coupling or hub at its crown, to which a pipe may be soldered, or into which a pipe may be caulked; the vent must not be less than two inches in diameter.

FROM BAYREUTH TO RATISBON.—NOTES OF A HASTY TRIP.[2]—X.



BALUSTRADE AT THE CHAPEL CHATEAU DE PIERRE FONDS. FRANCE. VIOLLET LE DUC ARCHT

FROM Nuremberg to Munich what a change — from perhaps the most interesting, from almost the most beautiful of the large cities of Germany to the very ugliest of all, to the town which is in all the Fatherland the most tiresome, unattractive and depressing in its outward aspect. Every one knows how Munich got its present shape —how it was a place of importance in the Middle Ages and in Renaissance days, but one which, from the lack of good building materials, had not held a high architectural rank; how, when Bavaria was raised to a kingdom at the beginning of this century, and a fresh wave of interest in artistic things was rising in Germany, its rulers sought to enlarge and adorn it, and how they worked over it with lavish expenditure and vast enthusiasm, and with the aid of what was unquestionably the best German talent of the time. But no one who has not seen it can realize how utterly they failed to make it a beautiful or imposing, or even a comfortable-looking town. Their hope was to give the world examples of how buildings of all sorts should be erected; but the result is that a stay in Munich, and an examination of its structures is the most forcible possible object-lesson in the art of how not to build a city. Were all their love and labor lost, then? Did nothing result from it but an ugly, pretentious city, standing as a warning to future princes that art cannot be "encouraged" unless it has a vital and fertile root of its own to grow from? I think not. Their architectural work itself was in vain, but not their precept and their example. If they did not create good works they at least impressed upon the German mind, at a period when such a lesson was peculiarly necessary, the fact that to aspire to artistic creation was a worthy aim for a nation, and to foster earnest aspiration and effort a worthy task for a nation's chief. To-day we respect their will if not their deed, and we acknowledge that very much of the interest taken in art to-day in Germany, and many of its best results are due to the munificent patronage and the unmistakable love of Maximilian and Ludwig, of Bavaria.

Maximilian the First, the contemporary of the great Napoleon, was the first to move toward the would-be improvement of his capital. Karl Fischer was his chief architect, and worked, as might be expected, in the current French style of the time. No man ever had a finer opportunity, for, as Boisserée wrote to Goethe, there is a whole quarter of the town which may justly be called the "Fischer Quarter." He built the Karolinen Platz, and the Karlstrasse, the hospital, and the theatre — the last named very French in feeling. with great detached columns, a massive gable, and pilasters and lunettes *ad libitum*.

After Maximilian came Ludwig, and after Fischer, Klenze. In 1825, when Ludwig came to the throne, taste was working back from French to classic models, and Klenze built chiefly in what seemed to him a pure Grecian style. He built the Glyptothek (1816–1827); the Walhalla, at Donaustauf, some miles from the city, a Doric peripteral temple destined as a pantheon for the heroes of Germany (and a queer lot they are, by the way, whose monuments have been enshrined within its walls); the Ruhmeshalle in a suburb of the town (in front of it being the huge statue of Bavaria), which is the pantheon of Bavaria proper, and is a horseshoe-shaped Ionic building, flanked by a "temple" at either end; and the Propylæa between the Glyptothek and the Exhibition Building, whereon is recorded in sculpture the union of Bavaria and Greece at the accession of Otto the First — a union destined to be as short-lived as has been the admiration of this monument. Then in the "Roman-Renaissance" style he erected the "Old Pinakothek;" in the Grecian, the "New Pinakothek," finished in 1853; in the "Florentine-Renaissance," the new palace, and in the "Byzantine-Italian," the chapel of All Saints. It is safe to say that he came no nearer the spirit of his model in one case than in another, and that all his essays are equally cold, formal, uninteresting and depressing. Ludwig's idea was to place in his capital examples of all the great building styles to serve as lessons for the public, and as encouraging models for the architects of the future. But all that the student could gain from them to-day would be the impression that no man in any age or country had ever built anything beautiful, and that the architect of the future must needs go on producing works rivalling each other only in dreary inanition and ugliness. Good materials are hard to get in Munich, and these many structures are merely stuccoed and painted in imitation of styles originally conceived in stone. To-day the colors are faded, the plaster is cracking and peeling, and a general air of undignified, sulky shabbiness pervades these buildings, which are not fifty years old — which were unbeautiful when new, and are unsanctified in their so premature decrepitude.

After Klenze, or rather as a somewhat later contemporary, came Gärtner, contributing still more to the architectural medley and dreariness. He was the friend and fellow-worker of the band of German painters and sculptors who lived together at first in Rome, who were so deeply admired in their day, but whose only interest now is of an historical and not an artistic sort—whom we examine and respect for the same reasons that we respect their royal patrons — because they loved so well, if not very wisely, the crafts they practised, and because they drew public attention to the worth and dignity of art, and gave it an impulse which has profited later generations more than one might think did one look at their works alone, and not know how or when they were produced — after a period of such apathetic deadness, and in the teeth of such utter indifference, such Philistine ignorance on the part of their countrymen. These men—Cornelius, Overbeck, Schadow, Veit, Koch, Führing, and the rest—were, like the architects I have named, inspired with the utmost enthusiasm, learned, cultivated, industrious, devoted almost beyond compare; but they were not *artists born*, and their works all put together have less intrinsic value for the artist or art-lover of to-day than a single hasty sketch by one who had the true spark of divinity—yes, though this one were ignorant, lazy, careless, as have been so many of the guild.

Gärtner built what is perhaps the most depressing structure in all this depressing mass of costly, ambitious and unsuccessful works— the great open *loggia*, which was an imitation of the Lanzi *loggia*, in Florence — an imitation which would make one laugh if it did not make one weep, and which to this day contains but two of the many statues which were intended to commemorate the great Bavarian dead. Gärtner marks another stage of local taste—after the French had come the classic fashion, and now he threw his weight in the scale against classic tendencies and in favor of the art of the Middle Ages. Here of course he was at one with the painters and sculptors who were his friends, and who brought about the romantic reaction in Germany. The Ludwig's Kirche is his most important work — a great uninteresting church which aimed at reproducing the style of the Italian Romanesque, but which has not a particle of its effect or spirit in either plan or detail. The likeness is further lessened by the fact that he made the apse square-ended to give room for a huge fresco by Cornelius. But enough of these mechanical, uninteresting, uninstructive buildings—for works of architecture they are hardly to be called.

The painters of the time do not, as I have said, afford us much more pleasure. Cornelius was the greatest, but looking at the immense fresco in the Ludwig's Kirche it is hard to realize that this was the man whom his contemporaries looked upon as a god in art, and whom a famous German art-critic, Hermann Grimm, can even

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[1] *American Sanitary Engineering*: Edward S. Philbrick, New York, 1881.

[2] Continued from page 305, No. 392.

to-day laud as a second Michael Angelo. He was a perfect draughtsman, it is true, learned, conscientious, and correct to a hair's breadth; and he had great ideas, but being ideas of a literary, intellectual, philosophical rather than a pictorial, artistic sort, they hampered rather than helped his art. We need a commentary in words to grasp all his intentions, and even then his painted work does not reveal what he must have felt. In composition he was learnedly mechanical, without a particle of spontaneity or grace of any sort. In color he was without a ray of genius. One cannot regret with Grimm that the cartoons for the Berlin *Campo Santo* were never executed in color, for, as now shown in that city, they are far preferable to these completed color-works in Munich.

The "New Pinakothek" — the adjective does not apply to the building, but to its contents, which are modern pictures — is full of the works of his fellow-laborers. A more dreary collection could hardly be imagined, and it would be interesting to know how many art-lovers passing through Munich, or dwelling therein have ever entered its doors a second time. Very few pictures have been bought in recent years, and the current Munich School is represented by but one or two examples. After seeing the first room, with Piloty's Death of Wallenstein and his immense Triumph of Germanicus (superbly painted, but a scene or a panorama rather than a picture proper), one finds nothing on the walls but the dry and tedious relics of the generation I have noted. An immense respect fills one's mind as one gazes — respect for those who could have loved art so passionately and so truly during long and earnest lives, when art must have appeared to them — their own art at least — so formal, so dead, and so mechanical. I suppose it did not so appear, but when one recollects that the greatest painters of past days were their adoration, and that they compared themselves conscientiously with these, one can hardly understand a state of blindness that would hide the defects of their own productions. They were good draughtsmen and that is all. Their color is harsh, and crude, and savorless; their handling hard, dull, monotonous, painstaking and over-elaborate; of tone they have no notion; in composition only the precepts of formality have guided them; in life, in character, in expression, their pictures are totally deficient. One becomes more and more depressed in passing from room to room. If the pictures were only worse the pilgrimage would be more lively, but it is impossible to laugh. The correctness of the drawing, the learning and sincerity displayed, lift them out of the domain of the ludicrous without bringing them into the domain of the artistic. If only they were not so painfully correct and careful, then there would be some interest in the thought that perhaps under other circumstances they might have done somewhat better; but evidently every man knew all he could ever learn, and did his very best. They are not painters, that is all; but that is enough to make one wish, on leaving the building, that one might never see a picture of any sort again in life. And even when this mood passes over, one registers a vow that should fate prescribe a future residence in Munich, yea, though of a dozen years, one's feet would never again cross the threshold of the New Pinakothek. The only works of any interest it contains, beyond the two Pilotys already mentioned, are Rottman's Greek landscapes, and these are valuable less for artistic than for topographical reasons. They are carefully chosen and painted scenes, which give one a really vital idea of the most famous sites in Greece — minus the local atmosphere and color — and so are not unworth attention and recollection. One other work excites interest, however, chiefly because one is so surprised to find it here — a little landscape by our own Washington Allston. I wish I could say it stood out with any prominence from the dull average of its similar surroundings.

Maximilian II, who came after Ludwig, did not keep in the old path of architectural imitation but took a novel turn — aiming not to copy any one style exactly, but to form a new one from the combined elements of the old. As was said at the time, "he wished to secure the solidity, the picturesqueness and the aspiration of the Gothic, with the charming decorative forms of Renaissance, and even of Rococo days." In the Maximilian Strasse, now the chief street of the town, his architects had full swing. When one looks at the details of its tedious elevations one finds that though the effect is of great monotony scarcely two houses are alike; all sorts of queer forms, combinations and amalgamations having been tried, with, it is safe to say, not a single successful outcome. At this time was also built the "Maximilianeum," a great classic building crudely colored, which stands on high ground across the end of the street, between it and the "English Garden." And it is not very long since there was completed on this street the National Museum, which (however one may delight in the beauty and variety of its contents) is none the less distressing in the unbeautiful variety of the forms which have been applied to its would-be decoration. Latest of all the buildings of Munich is the new Rath-Haus, in which the sad idea of amalgamation was abandoned, and the architect went back to the careful copying of a single style. It is certainly the most satisfactory of modern Munich edifices — a careful, scholarly, and not unbeautiful, if rather cold essay in late Gothic forms. Here we see again what I have already noted as the characteristic of all the best decorative work done in Germany to-day — slavish adherence to precedent in the minutest as well as the most important features. Every detail of the ornamentation, every chair and table, and bit of iron-work, even the very towels which hung on the racks in the dressing-rooms, and the pitchers and mugs beside them, were proudly pointed out as being exact duplicates of objects executed in the given century, and now enshrined in the museum of the city. Only in the glass windows was there an attempt at original designing. These showed rather interesting groups personifying the various activities over which the city fathers watch, and were quite good in color.

There are, of course, earlier relics in Munich than those of which I have thus far spoken — but none of prime artistic importance. Chief among them is the Marienkirche — an immense late Gothic church, begun in 1468 on the site of an earlier building. It is of brick throughout, and is not wanting in great dignity of feeling, due to its proportions and not to any worth or charm of detail. The very sparsely-applied ornamentation is worked in sandstone, but it does not relieve the exterior from an appearance of coldness and baldness. Inside, however, things are much better. The brick pillars are enormous in size, and rise straight to the roof, branching without capitals into the vaulting, thus forming one of the *Hallenkirchen*, with nave and aisles of equal height, of which I have already spoken as so beloved of later German architects. I have never seen the type displayed in such huge proportions as here, and the effect is certainly most imposing. The windows rising to the roof are of enormous size, and the wide aisles continuing around the choir give great breadth and dignity to the plan. The custodian does not fail to take the visitor to a certain spot near the western door, where a footprint is carved in the pavement. One notes with something more than mere curiosity that from this particular point of view the huge columns hide every window from sight. The impression as of a vast expanse full of towering shafts, lighted from one sees not whence, is not without its charm.

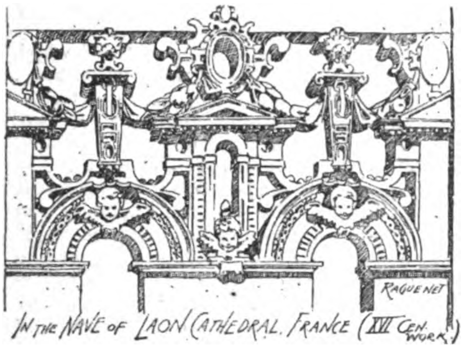
The Old Palace, built in the seventeenth century, would be an interesting example of the time were there more of stone and less of plaster about it, and the interior of the small theatre is said to be one of the most elaborate and charming examples extant of Rococo decoration. It was closed for the summer, however, and I was unable to compare it with its contemporary sister at Bayreuth.

The surroundings and situation of Munich are as unattractive as its architectural effect. It stands in a flat, almost treeless plain, and though the Isar runs through it, "rolling rapidly," a flood of foamy water of the most beautiful light-green color, it does little to enliven the scene. The English Garden, as the park is called, is very pretty, but lies so low that it is damp and rather depressing. The Ruhmeshalle, of which I have already spoken, with the huge statue of Bavaria in front of it, was placed out of town with the idea that the best quarter of the city would spread in its direction, but such has not been the case. The drive to it takes one through second-rate suburbs, and it has the air of looking into the back-yard of the city. As for the "Bavaria" itself, and all the other countless works with which Schwannthaler filled the city, what shall I say? They may be scholarly, they are certainly not artistic. This colossal figure, which dwarfs the building behind it in the most unfortunate manner, is huge without being grand, heavy in pose, ugly in drapery, lifeless, altogether wanting in every sculptural quality. One seeks in vain, either far or near, for a point of view whence it composes well or comes in an agreeable outline against the sky. Each new view shows it as more hopelessly awkward than before. It is the very incarnation of the studious, earnest, but inartistic quality which pervades every work of the period to which it belongs, and Schwannthaler's smaller works are not much better. He turns up at every corner, and in every public building — with the result that one grows to feel one could accept the rest of Munich if only Schwannthaler had never been born. There is nothing grotesque, nothing stupid, nothing silly about his work, — only those most tiresome and discouraging things in art — learned mediocrity, inartistic conscientiousness. One is almost driven to exclaim after a few days' acquaintance with these Munich painters, sculptors, and builders of two generations past, that learning and conscientiousness are the worst foes to art; — better the wildest extravagance, better the naïvest blundering, better the most childishly unsuccessful if spontaneous daring.

M. G. VAN RENSSELAER.

THUNDERSTORMS. — Thunderstorms have for the last four years been the subject of careful observation both in Bavaria and Wurtemberg, where the dangers which result from them, and still more from hail showers, make the farmer take a keen interest in the weather. The number of weather stations being found insufficient, the Meteorological Office proposed that people in all districts should undertake to send in regular reports immediately after each storm. For this purpose post-cards were issued, on which the exact time of first thunder and lightning observed; wind direction before, during, and after the storm; rain and hail period, and further observations were to be stated. The appeal was most readily responded to, and there are at present two hundred and seventy-nine regular observers, who have been found quite reliable in despatching their cards, which pass free of charge. The statistics thus gained show that thunderstorms principally arise in localities which favor local differences of temperature, so that certain places may be considered their breeding grounds. They affect most intensely the ridges between two local centres of barometric depression, and move in long, narrow fields, different points of which, even if far apart, being visited at exactly the same time. The storms proceed in a direction vertical to the front of the field, independently of local winds. By far the greater number take place between 2 and 4 P.M., and again between 1 and 3 A.M. It is somewhat strange that during the year 1882 both these maxima were delayed by about an hour. In one case sheet lightning was perceived at a distance of one hundred and fifty miles. This system of observation was first introduced in Bavaria, but soon adopted by Wurtemberg. — *Engineering.*

THE DRAINAGE OF THE VALLEY OF MEXICO.



ENGINEERING NEWS thus epitomizes a very interesting paper on the drainage of the Valley of Mexico, read by Señor Francesco de Garay, C. E., before the American Society of Civil Engineers, in October last. The paper was published in full in the *Proceedings* of that Society: —

The drainage of this valley of 1,800 square miles in area is a difficult subject to deal with. It is a basin receiving the water of 2,500 square miles of mountain and valley surrounding it, and prevented by natural barriers from discharging these waters into the Gulf of Mexico, through the Mocteruma River. At present the table-land of the valley is mostly occupied by different lakes, the principal and lowest of all being Lake Texcoco, with an area of ten to twenty square leagues. As these lakes have no outlet, the waters of the most of them are saturated with the natural salts of the soil.

When the Aztecs or native Mexicans became masters of the land and founded the city of Mexico, the chief problem presented to them for solution was the prevention of the periodical inundations from the lakes. About one hundred years before the Conquest, under the reign of Montezuma Ilhuicamoira, the great dike of Mexico was built by his nephew, the King of Texcoco, who, while famed in history as a wise legislator and a poet, should also be remembered as a daring and successful engineer.

This structure was eight miles long, and built of rubble crowned with masonry. It ran north and south, and divided the lake into two great parts; the eastern half took the name of Lake Texcoco, and the western half was called the Lake of Mexico. By this dyke the fresh water from the southern lakes of Chalco and Xochimilco were confined to the Lake of Mexico, and washed the shore of the city of Mexico, separated from the salt waters of the Texcoco, and the city was saved from the danger of inundation from the River Cuantitlan, the chief cause of trouble.

The Spaniards, under Cortez and his successors, not realizing the true value of the great engineering work, suffered it to fall into decay, through the agency of man and the slow work of nature. They denuded the hills of their forests, to rebuild the capital and other cities, and to deprive the natives of a refuge. The rains washed the soil into the lakes, and gradually raised their level to such a degree that they again flooded the city of Mexico. To guard against this later evil, new dikes were run in all directions and the surface of the valley soon converted into pools of stagnant waters, regardless of the public health. In 1580 a general survey was made of the valley, with the view of opening a direct outlet for the water, but no actual work was accomplished. In 1605, under the pressure of new calamities, Enrico Martinez, cosmographer, mathematician and printer, came to the rescue of the threatened city, and proposed to get rid of the waters of the lakes by means of a tunnel passing through the hills to the north of Mexico. This tunnel was more than six miles long, ten feet wide, and ran through a formation of hard-pan, with strata of sand and marl; it was finished in the short space of eleven months, in 1608. A temporary lining of timber was at first put in it, afterward replaced by masonry. Soon after its completion it became obstructed from some unknown cause, the upper lakes were filled, and the city of Mexico once again totally flooded, and remained so for four years, during all of which time the unfortunate engineer was confined in a prison. After the floods had subsided it was determined to replace the tunnel by an open cut, a most unwise and unfortunate decision, as events proved. The same Enrico Martinez was ordered to execute this monstrous work, and died after thirty-five years' labor. For one hundred and fifty years this great cut of Nochistongo was the main occupation of the people of Mexico, and was at last finished; its greatest depth is 200 feet. Millions of money were expended, and from one hundred thousand to two hundred thousand Indians perished in the undertaking.

This work, begun in 1608, was never properly finished, and to this day requires constant care and labor to keep it even in tolerable service. Rapid changes are taking place in the valley of Mexico, partly due to the direct action of nature, partly due to the agency of man, and the city of Mexico is yet periodically visited by disastrous inundations. As illustrating the changes that have taken place within the city, an Indian pavement made of cement, with a polished surface, was lately discovered twenty feet below the present ruins of the convent of Santo Domingo, showing a constant rising of the surface by sedimentary deposit. This pavement must have been laid centuries before the Spanish Conquest; the sand employed in its construction is no longer found in the streams of the valley. A large quantity of pumice-stone was also used in its composition. Cortez found Lake Texcoco an important body of water forty or fifty feet deep, and, to assist in capturing the city of Mexico, he constructed four brigantines on the water of this lake from material saved from his ships when he burned them in the Gulf. These same vessels were again taken to pieces and, reconstructed, were launched on the waters of the Pacific, at Sihuatanejo, to continue the exploration of the south coast. Lake Texcoco, the place of the famous naval victory of Cortez over the native Mexicans, is now a barren, swampy plain.

Señor de Garay many years ago presented a complete and comprehensive plan for the drainage of this valley. His plan was approved and work commenced, but practically little was accomplished. His paper is accompanied by a map showing the details of the system proposed. Briefly outlined, this plan consists of a number of properly located connecting canals, of small section, emptying into a main canal lying in the lowest part of the valley, about thirty-three and one-half feet wide at the bottom, fifty-three feet wide at the top, and ten feet deep. This main canal begins at the Gate of St. Lazaro, on the eastern side of the city, and runs northeast by east, until it reaches the centre of Lake Texcoco, thence toward the north, following the general direction of the lakes Cristobal, Xaltocan and Zumpango. On reaching the slope of the hills which close the valley to the north, the canal leaves the old line of Nochistongo to the left, on the western slope of the Citlaltepec Hill, and cuts through its eastern slope under the pass of Tequisquiac. At this place a tunnel about 27,566 feet will be necessary to reach the ravine of Amatlac, that communicates with the River Tequisquiac. The total length of the main canal, from the gates of the city of Mexico to the last-named river, will be thirty and one-half miles; the fall in the canal will be one in eight thousand. The tunnel is in form a horseshoe, with an inverted arch and about 194 square feet in section, with a fall of one in one thousand. Ten million dollars was the original estimate of cost, though the present increased price of labor in Mexico will add materially to this sum.

THE ILLUSTRATIONS.

THE HILDRETH BUILDING, LOWELL, MASS. MESSRS. VAN BRUNT & HOWE, ARCHITECTS, BOSTON, MASS.

COMPETITIVE DESIGN FOR A $3,000-HOUSE, SUBMITTED BY "*Colonna.*"

"'COLONNA' presents a novel and ingenious plan kept within a rectangular outline. He has made several marked economies of varying value. Thus, while providing flues, except in the 'den' he has no fireplaces. This recourse to stoves would have been less intolerable a generation ago than now. Another economy, which would effectually prevent the house from finding an occupant of the kind intended, is the omission of a bath-room. More successful is the arrangement by which the front stairs meet the back stairs on a common landing projected out as a handsome bay. Nothing indicates the use the space under this landing is put to, and no door nor window opens into what might be valuable space. The elevation, with its gambrel roof, cannot be counted a success; it is clumsy, and the lines do not mass well. The plumbing item of $35 is of course too low, and to this should be added the cost of a well-appointed bathroom. The drawings are treated with a spotty exaggeration of light and shade which defeats its own purpose." — *Extract from Jury's Report.*

COMPETITIVE DESIGNS FOR A MECHANIC'S HOUSE SUBMITTED BY "*Peregrine White*" AND BY "*Country.*"

"'*Cassius*' and '*Peregrine White.*' These two sketches are so much in the same spirit that the same remarks apply to both. They have a much better feeling in the design of the exterior than any of the other drawings, but it is fair to say that this is gained by a plan that gives small rooms and a long hall, and which makes two chimneys necessary. Although a long and low exterior is thus gained, the plans are not such as would be most useful to a mechanic. The front door in '*Cassius's*' design seems oddly placed, possibly by reason of the effect added to the outside by the porch roof at the end of the group. '*Peregrine White's*' drawing is simple and choice, and the finish of the eaves is knowing and good. Both drawings seem to have been mainly made with a view to an attractive exterior, and in this both are successful."

"'*Country.*' Very good plan indeed; good enough for a better class of house. Good mantel. Fair exterior, but not especially attractive; not nearly up to the level of the plan." — *Extract from Jury's Report.*

Killed by a Tombstone. — The story of the sculptor at Ayr (Mr. Smith) who is reported to have been crushed to death by a heavy monument on which he was at work, and which he somehow brought down upon himself from the platform on which it had been raised, recalls several similar stories of antiquity and of the Middle Ages, in which the sculptor is represented as struck to the ground and killed by his own creation. Sometimes, too, a statue will fall in an independent manner on a person who had taken no part in creating it, but who had been guilty of some offence generally toward the statue itself. A statue, for example, having been erected during his lifetime to the wrestler Theagenes, a jealous rival approached it one night, and, after insulting it by word of mouth, seized it by the beard and pulled it down upon himself with crushing effect. An endeavor, too, has been made to explain by a like affront, followed by like consequences, the legend of Don Juan and the statue of the commander. Unhappily, in the case of Mr. Smith the story is true. The monument that crushed him was a tombstone weighing upward of half a ton. — *St. James's Gazette.*

THE $3,000-HOUSE COMPETITION. — XV.

SPECIFICATION SUBMITTED BY "*Colonna.*"

CELLAR: — Foundations of rubble-stone to sill, 18″ thick. Cellar will consist of store-room and coal-bin. About one-half the space will be excavated. No finish; stone wall whitewashed.

Ground Floor: — Finish on ground floor of pine, to paint, with the exception of the first run of stairs, which is of ash. In hall there will be a dado of matting; none elsewhere. Plain base moulding 7½″ high. Door architraves 4″ x ⅞″. Mantel in "den" consists of a simple moulded shelf. The fireplace is of rough stone (the only one in the house). Seat in "den" to have cover to lift. China-closet and pantry will have shelves and pegs only; no cases. One row of hooks in coat-closet. A curtain may be used in connection with the sliding-doors between parlor and dining-room, and may be furnished by the owner, as may also the one on stair-landing. Picture-moulding in parlor, dining-room and "den."

Second Floor: — The closets of the chamber floor are to be provided with one shelf, with one row of hooks under. Common base-board in all the rooms.

Attic: — Attic consists of one bedroom, 12′ x 12′, and 7′ 6″ high, and store-room under roof.

Exterior: — Architraves consist of a simple thumb moulding, and water-table and string-course are simply a lapping of the clapboards and shingles.

The exterior windows will be painted white (sashes and frames) and blinds black; all the trimmings of the house will be painted in black and white. Shingling on the walls will be covered with creosote. Clapboards not painted, but oiled.

Stairs: — 5″ square newel, with corners rounded, moulded cap; other parts same, out of 4″ stock. Rail, 3″ x 3½″, plain moulded. Balusters out of 1¼″, plain, square, with corners rounded off, three on a tread. Stairs painted in black and white.

Doors: — Front, 1¾″ thick, glazed as shown; other doors on ground floor 1½″, four-panelled, without mouldings; all other doors 1¼″ thick. They are 7′ high on ground floor, and 6′ 8″ elsewhere.

ESTIMATE OF QUANTITIES AND PRICES RULING AT BOSTON, MASS.

CARPENTERS' WORK.

9,000	ft. of spruce lumber,	@ $17.00	$153.00
4,500	" partition stock,	@ 16.00	72.00
7,000	" hemlock boarding,	@ 15.00	105.00
900	" clear spruce clapboards,	@ 30.00	27.00
25,000	pine shingles, sawed,	@ 4.00	100.00
1,200	ft. of outside finishing stock,		50.00
100	" wood gutter,	@ .12	12.00
	Windows complete		200.00
	Doors (including furniture)		175.00
	Front porch		75.00
	Inside finish, pine to paint		200.00
	Upper floors, clear spruce		98.00
	Stairs (part ash)		135.00
	Hardware and nails		125.00
	Mill-work and carting		75.00
	Carpenters' work (including commission)		650.00
	Total		$2,252.00

MASON'S WORK.

20 squares of excavation,	@ $2.50	$50.00
60 perch of stone,	@ 1.75	105.00
Laying and pointing same,	@ 1.25	75.00
5,000 bricks for chimney,	@ 10.00	50.00
Labor, including sand and lime,		75.00
7 stone thimbles,	@ .50	3.50
1,000 yds. of plastering,	@ .25	250.00
One fireplace and hearth,		35.00
Total		$643.50

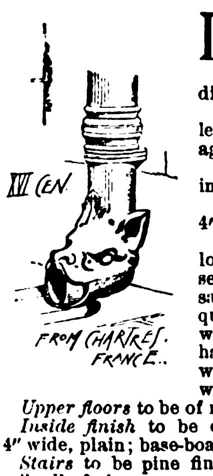
MISCELLANEOUS.

Painting (not including glazing)	$200.00
Conductors	15.00
Plumbing	35.00
Architect's commission	150.00
Total	$400.00

TOTALS.

Carpenter	$2,252.00
Mason	643.50
Miscellaneous bills	400.00
Total	$3,295.50

THE COMPETITION FOR A MECHANIC'S HOUSE. — III.



LABOR and materials required for the erection of a dwelling in accordance with a design conceived by "*Peregrine White.*"

Cellar under space comprised in stairway and dining-room.

Foundation and underpinning to be of common ledge stone, 16″ thick at top, 20″ at bottom. Drainage to sewer with proper traps.

Chimneys of common brick, plastered outside and inside.

Frame, spruce; sills, 6″ x 8″; posts, 4″ x 6″; plates, 4″ x 6″; rafters, 2″ x 5″; floor-joists, 2″ x 8″, etc.

Boarding of walls and roof and under floors, hemlock; sheathing-paper on walls. Outside finish, good seasoned pine. Walls to be covered with good quality sawed cedar shingles. Roof to be covered with first quality sawed cedar shingles. Gutters, V-shaped; wooden round conductors. Windows: frames to have hard-pine pulley-stiles; sash to be 1½″ thick; glazed with first quality single-thick German glass. Blinds where practicable.

Upper floors to be of mill-planed spruce.

Inside finish to be of good quality seasoned pine. Architraves to be 4″ wide, plain; base-boards, 5″ high, bevelled top.

Stairs to be pine finish, on spruce plank stringers; balusters, posts and rail, all of pine.

Doors to be four-panelled, mill-made, 1½″ thick. Hardware to average in cost $2 per door.

Twenty dollars for mantel-shelves and brackets.

Plastering to be two-coat work; the first coat to be thoroughly seasoned before the skim-coat, which is to have a light-brown tint, shall be applied. Walls to be left unpapered.

Painting: — Wall shingles to receive a coat of powdered slate in raw linseed oil; then another coat of raw oil. Outside finish and blinds to have three coats of brown olive paint. Inside finish to have three coats of paint, of warm cream color.

ESTIMATE FURNISHED BY MILLER, LADD & CO., OF BOSTON, MASS.

Excavation, 100 yds. excavating, @ 20 c.		$20.00
Cellar wall, 45 perches stone wall, @ $3.00		135.00
Piers, and 2300 bricks, laid		46.00
Chimneys, 560 yds. plaster, at 20 c.		112.00
Sills and outside frame, including roof	Frame	96.00
Flooring-joists		
Partitions: 6 M. spruce lumber, @ $16		
Rough boarding of walls		
Lower floors		
Roof boarding, 5 1-10 M. hemlock boards, @ $13		66.30
Shingles, 24 M., @ $3.50		84.00
Outside finish, including gutters, etc.		50.00
Top flooring, 2 M. @ $30.00		60.00
Nails		20.00
16 doors, @ $6.50		108.00
18 windows, @ $5.50		99.00
Inside finish		25.00
Pantry and china-closet		35.00
Stairs		55.00
Sink and plumbing		35.00
Painting		100.00
Labor		325.00
Total		$1,491.30
Builder's profit		62.00
Architect's commission		80.00
Total		$1,633.30

MEMORANDA FOR HOUSE DESIGNED BY "*Country.*"

This house is supposed to be built near Haverhill, Mass.

Foundations to be of pasture-stone, with 8″ brick underpinning. Frame to be "balloon;" sill, 5″ x 6″; joists, 2″ x 8″ and 2″ x 7″; rafters, 2″ x 6″; inside studding, 2″ x 3″.

Hemlock boards are used for walls, roofs, and under floors.

Roof is covered with good sawed cedar shingles.

Outer walls are covered with spruce clapboards up to top of first-story windows, and with spruce shingles above.

Sashes ready-made, glazed with second quality German glass, except staircase window, which is to have cathedral glass, as is also the upper part of front door. All doors, except the front, to be mill-made.

Inside finish: — The entire house is to be finished inside with whitewood, which in some of the rooms will be stained, and in others finished in the natural color. The floors to be of country pine.

Plastering is to be one-coat work on walls and two on ceilings. Fireplace and hearth of pressed-brick.

ESTIMATE.

Excavation, 168 cu. yds., @ 22 c.	$36.96
Cellar wall, 46 perch, @ $3.50	161.00
Brick underpinning, 3 M., @ $12	36.00
Chimneys and fireplace	50.00
Frame in place, 7100, @ $17	120.70
Hemlock boards, 4750, @ $13	61.68
Outside finish	25.00
Clapboards	23.00
Spruce shingles for walls, 10 sqrs.	16.68
Cedar shingles for roof, 10 sqrs.	34.50
Windows and blinds	80.00
Doors	95.00
Staircases	125.00
Nails	35.00
Upper floors, 1476, @ $20	30.00
Lath and plastering, 496 yds., @ 18 c.	91.28
Tin conductors, 38 ft., @ 6 c.	2.28
Mantel	20.00
Painting	125.00
Plumbing	150.00
Total	$1,309.08
Builder's profit, 10 %	130.90
Architect's commission, 5 %	71.99
Total	$1,511.97

HAVERHILL, MASS., April 19, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

I will build the house designed by "*Country*" for the sum of $1,439.98.

I. E. WASHBURN, Builder.

RECOLLECTIONS OF FLEMISH ARCHITECTURE.[1] — II.

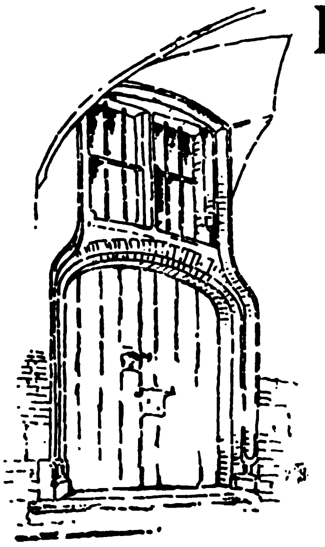


Fig. 1.

KNOWING from information in the invaluable Baedecker or Murray that Ostend is in possession of an English church, we had previously decided to spend Sunday here in preference to Bruges. The Sabbath morn, instead of dawning peacefully, is heralded by a continuous hammering proceeding from the far side of the square opposite the hotel windows. Our attention is arrested, and the interval elapsing between dressing and breakfast is beguiled by watching the performance going on outside. By slow degrees a stage is erected, draped with gay hangings inclosing an altar with the usual accompaniments of vases, flowers, candlesticks and crucifix. Next we see several girls dressed in white with long white vails, hurrying across in the direction of the principal church, small boys carrying banners, and women with large baskets filled with cut flowers. A band of music parades the street, and people occupying shops and hotels round

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[1] A paper read before the Leeds Architectural Association, by W. H. Thorp, and published in the *Building News*.

Continued from page 19, No. 394.

the square display the tricolor flag of Belgium striped with red, blue and yellow. What does it all mean? An inquiry elicits the information that the day is to be devoted to the celebration of one of the numerous church festivals, this being about the most popular of the series, St. Peter, the patron saint of fishermen, being the saint honored on this particular occasion. It being Sunday, we are supposed to shut our eyes to mundane affairs; thoughts architectural should be excluded, and a description of this ecclesiastical ceremony may not come amiss as an oasis in the desert of technical detail and description. We wend our way through crowds of people lining the streets to the central object of attraction, the church of St. Peter and St. Paul, at the end of the Rue de l'Eglise, and succeed with difficulty in effecting an entrance. A fugue is being played on the organ, and it is thundering out its loudest notes while Monsieur le Curé is marshalling the procession in the centre of the nave. The interior is not easily discernible, what light there is being made still more dimly religious by the cloud of incense which wreathes itself into fantastic shapes as it rises upwards. By degrees, and with the light afforded by some candles which are guttering in their sockets alongside one or two side chapels dedicated to favorite saints, the inside of the church reveals its proportions, and the misty outlines assume form and color. There is really little to see or to claim attention — merely the usual kind of thing you expect to find in many of the Roman Catholic churches abroad. Architecture and detail of that early, sprawling Rococo kind of art (if art it can be called) that sometimes goes by the name of Jesuit style — gorgeous altar-pieces resplendent with lace, candlesticks, and gaudy accessories, gaily painted representations of saints, the ten Stations of the Cross on either side of the nave, gloomy, cavernous-looking confessionals, side chapels with separate altars hung round with votive offerings, and to comprise everything an atmosphere of tawdriness and lack of cleanliness, which even the reflected lustre of costly marbles, the wealth of color from painted glass windows, and the mellow tone of some old masterpiece by Rubens or Vandyke are unable to counteract or dispel. To return to our subject. The procession is at last drilled into something like order, late arrivals hastily join the ranks, proud mothers administer finishing touches to the festive attire of their children, and subdued exclamations of admiration are heard, such as, "Voilà, la petite Célestine, comme elle est très belle," as one after another of the youthful contingent attracts attention. All is at length ready; a louder series of notes from the organ than before signals departure, and the procession slowly files its way outside through the portals. The military band strikes up a lively march and heads the troupe. First of all come girls clothed and veiled in white, bearing flowers, bannerets, and symbols, followed by boys of tender age clad in curious costumes of blue and white, carrying long poles terminated with silver spades gaily decorated with ribbons fluttering in mid-air; next come men bearing painted and gilded representations of the Infant Jesus, the Virgin and Child, and Christ when grown to manhood. After these, acolytes in white surplices grasping white poles terminated by gilded lanterns enclosing lighted candles next attract attention, succeeded in their turn by other acolytes carrying incense burning within silver vessels suspended by long chains, who swing their censers at arm's length in splendid style. The lower clergy, chanting Latin psalms, bring up the rear, the procession ending with the Bishop, with Host uplifted, robed in vestments embroidered with gold, under a gorgeous canopy held by men at the four corners. As they move along fishermen's wives strew the street before them with flowers, and the people standing at their shop doors have crucifixes displayed and candles lit in their windows. Leaving them on their way to the altar, in the Place d'Armes, we hasten to the English church, and there attend service, a very small congregation being present, and the whole proceeding a rather dull and lifeless one. In the afternoon we walk along the shore to the Mariakerke, and see a similar procession, only on rather a smaller scale than the one in the morning, the temporary altar being put upon the top of the sea-wall, where a mass is performed, the priest in conclusion holding up the Host in front of the sea and pronouncing his benediction upon it. The scene is most impressive, and would form a capital subject for an artist. We must not linger longer in Ostend, but must transport ourselves to Bruges, where our sketching work is to commence in good earnest. The distance is only some twelve or fourteen miles, the journey being accomplished in half an hour. The country improves as we leave the coast and travel farther into the interior, the flat, low-lying sandy expanses devoid of vegetation giving place to rich pastures, thickly-wooded plantations and fields of grain already turning yellow, although the season is not yet far advanced. We alight at the old Marché du Vendredi. Passing the Cathedral, and traversing the Rue des Pierres, we at length find ourselves in the Grand Place facing the world-renowned belfry towering above a picturesque building of red brick, known by the name of Les Halles, one wing of which was intended for a cloth hall, the other being used as a flesh market. On the opposite side of the Place is the Hotel Panier d'Or, a genuine old-fashioned Flemish hostelry, where we take up our quarters, and are favored by the landlady with a room on an upper floor, with a capital large low window commanding a splendid view of the belfry, as well as an extensive prospect of the square and the buildings in its vicinity. The Flemish name for Bruges is "Brügge," signifying bridges, the city being intersected by canals in all directions. When Ghent and Antwerp were yet in their infancy Bruges was at the height of its wealth and importance, and during the fourteenth century was one of the principal seats of commerce in Europe. This accounts for nearly all of the buildings being Gothic in character, many of them of a rather Late period, and also for the lack of the Renaissance element as compared with the other two cities, whose prosperity was of a rather late date, where curved and pedimented gables are met with in great profusion. A preliminary walk round and survey of the place reveals something of interest at almost every step. Charming pictures of quaint gables, traceried fronts, eccentric turrets, their reflections mirrored in the still waters of the canals, meet our vision wherever curiosity leads us. Such a profusion of architectural tid-bits is, to say the least of it, embarrassing. How are we to make a selection for our sketch-books, and when that selection is made, how can we possibly leave so many suggestive examples of detail with no permanent record save that of the memory, which, alas, is too often apt to prove a treacherous friend? However, something must be done; so after ascending the belfry, seeing the panorama of town and country spread like a map at our feet, examining the complicated machinery which plays the carillons, said to be the finest in Europe, we grope our way down again in the darkness and emerge into daylight once more, in the interior court-yard of the building. Here we find a museum of antiquities, replete with stores of old, carved furniture, elaborate ironwork, stained glass, stamped and gilded leathern hangings, antique tiles, ornamental blocks of terra-cotta, arquebuses, old armor, and other things too numerous to mention. How we feast our eyes upon these treasures! Outside the sky is overcast, rain is commencing to fall, and the wind blows rather cold. Here we are under shelter. May we sketch? The question put to a superannuated old piece of antiquity in the shape of an elderly woman, a fitting custodian of so many relics of a bygone age, elicits the answer that it is forbidden, and not wishing to transgress the rules and so get into trouble, we depart with many expostulations. The court-yard is not devoid of interest, and sheltered in a recess from the rain, two or three hours are devoted to jotting down particulars of the series of windows with an outlook thereon, the lower ones having low elliptical arched heads, and those above the stone mullions, sills and heads inclosed within arches of Tudor outline, the tympana being filled in with brickwork. To give height to the wall, and in order to avoid horizontality of treatment, both ranges of windows are enclosed within recessed bays or wall-spaces with 4½-inch reveals, the angles being of brickwork, and rounded off with an ogee-shaped moulding. The interior reveals of the windows are chamfered, and are also carried out in bricks, the double order having moulded stops before the lowermost sill is reached. This method of enclosing two or three sets of windows in long vertical recessed panels is a very common feature in Flemish work, and nearly always looks effective. The mouldings of the arches finishing these recesses are often worked out into tracery and cuspings of quaint and uncommon outline, and where it is desirable to narrow the widths of the windows, as the upper stories are reached, the space is curtailed by means of an ingenious expedient in the form of an ogee-shaped shoulder-piece, in moulded brick, like the reveals, which, if somewhat odd in appearance, is thoroughly characteristic.

This feature (Fig. 1) we met with over a doorway in a vaulted recess at the end of the court-yard. On account of the springing of the groining points, it was undesirable to have the fan-light as wide as the doorway. Therefore at the level of the transom this ogee-shouldered corbel (if such it may be called) is introduced and answers the purpose admirably. The corbelled cornice round the eaves of the court, and a dormer, with pointed projecting hood to its hipped roof, have been added at a later period than the windows below, being early Renaissance in character, and fac-similes of the same find their way into our sketch-books before leaving the building. The weather still continuing unfavorable, we make our way to the cathedral dedicated to St. Sauveur, guided thither by its massive, low-roofed, Romanesque tower, which was added to the building within the present century, when the whole fabric underwent the process of restoration. The greater portion of the structure dates from the thirteenth or fourteenth century, and is built of brick. The chapels radiating from the apsidal choir form an effective bit of grouping, and the gable-ends of the transepts, flanked at the ends with octagonal turrets, corbelled out from the upper weatherings of the buttresses, are happy in their general proportions and detail. The large transept windows still retain their elaborate tracery, though whether it is ancient or was inserted at the time of the restoration, I do not feel prepared to say, and the upper wall-space of the gables is enriched with small two-light traceried windows carried out in brickwork, the apex stone being surmounted by a metal cross. Internally the church is lofty and well-proportioned; but, unfortunately, the effect is marred to a large extent by the gaudy coloring which has been introduced, covering both walls and vaulting, the surfaces being dissected all over with black horizontal and vertical lines to represent masonry. Two fine paintings are shown by the sacristan, one representing the martyrdom of St. Hippolytus, and the other a Lord's Supper by Pieter Pourbus, and some good well-engraved monumental brasses are worthy of attention.

The choir possesses some elaborately carved stalls (Fig. 2), adorned with the armorial bearings of the order of the Golden Fleece, which are capital examples of Late Gothic work, and whilst my companion sketches one of the ends, I occupy myself with a measured drawing of some heavy oaken doors of seventeenth-century character, whose upper panels are open, save for the insertion of turned, polished brass balusters, displaying exquisite contour of moulding in their sections. Returning in the evening to the hotel, we make a détour and pass the church of Notre Dame, where we find abundance of artistic material to take in hand on the following day. The serious business of

the day, to wit, the *table d'hôte* dinner, being an accomplished fact, we find our way as best we can to our room, traversing tortuous passages, finding series of steps, both up and down, where we least expect them, and finally making for the door of the apartment by scrambling up a flight of stairs of step-ladder gradient. The *chambre à coucher* we improvise into a studio, and make it answer both purposes during the week of our tarriance in Bruges. Who could desire a more congenial spot in which to invoke the spirit of the Middle Ages and depict on canvas picturesque scenes, radiant with life and color, of times gone by? What an outlook from the windows! The sky has cleared, the square assumes a more lively aspect, and is crossed by groups of peasant women, enveloped in long, black cloaks with silk-lined hoods, their heads covered with closely-fitting muslin caps. A gang of young men sing a glee or popular melody as they return homewards from their work, children in their wooden *sabots* are clattering across the pavement, and a detachment of soldiers in baggy blue-gray trousers are mustering in front of the arcades of the halls before turning in for the night. The old brown tower opposite is suffused with golden light, as the sun is sinking behind the distant roofs; to the right the finely proportioned tower and crocketed spire of Notre Dame stands out clear and distinct above the crow-stepped gables and fantastic dormers, while on the left the turrets and elaborately worked chimneys of the Hôtel de Ville reveal themselves in openings between the intervening buildings. A few more minutes and the glow has departed; a misty blue haze seems to rise from the ground, and the belfry wraps itself round in sombre shadows. The sky assumes a cold, translucent green tint shading off into orange-red on the horizon, while the young crescent moon glitters like a polished sickle in the heavens as the square is gradually shrouded in darkness. The music of the carillons is almost incessant, and is rendered still more noticeable as the busy hum outside gradually subsides. It is possible to have too much of a good thing, and music, however excellent it is in its way, is not always desirable, as Mr. Comyns Carr, the talented author of "Art and Letters" was unfortunate enough to find out a week or two ago; and unaccustomed as we are to a continual concert all day and all night long, it is many hours before sleep can be tempted to visit our weary eyelids. With the return of daylight we rise, and commence work before sitting down to breakfast, and for the rest of the week, and in fact for the remainder of the time we spend abroad, our routine for the day, with little exception, is as follows: — Rise at six o'clock, do two hours' work before breakfast. Breakfast over, work from nine to half-past one, then lunch of a very light description. Sketch again from two until five, when we return to the hotel to dine. Afterwards do another hour or two's work in our room, generally finishing sketches and filling in repetitions of detail, which can be done indoors as well as on the spot. Eight o'clock in the evening having arrived, we feel justified in setting off for a brisk walk for the sake of exercise, our rambles usually taking us in the direction of the outskirts of the city, where we come across many charming bits of canal scenery, and quaint old fortified gateways commanding the leading approaches from the country. In one of our evening strolls along the canal-banks a picturesque turret attracts our attention, and we find it is a portion of the house of the Guild of Archers of St. Sebastian. From one of the ramparts adjoining a wind-mill, a capital view of it is obtained, and notwithstanding the fast-departing daylight, a sketch soon finds its way into our note-books. From this point of sight the turret composes admirably with the panelled and traceried gable end, crow-stepped as usual, the expanse of foreshortened roof, and the foreground of foliage. What fertility of invention and originality of design is displayed in this conspicuous feature of the building, which one of the local guide-books informs us goes by the name of "la délicieuse tourelle." Delicious it may be according to the taste of the critic, but, whether or no, it is certainly eccentric. As it rises from the roof it is first square, then circular, and finally octagonal, its stages increasing in width as the roof is reached, the arched corbellings out and moulded finishes to projecting angles being nearly all carried out in brickwork. A measured drawing of the garden front of the building, including the tower, made by Mr. Gotch, is to be found in one of the past numbers of the *British Architect*, which shows the style of architecture in considerable detail. In the interior are to be found a bust of Charles II of England, who was, while resident in Bruges, elected king of the archers, together with a portrait of the Duke of Gloucester, his brother. A day or two are occupied with a sketch of the elaborate florid Gothic baptistery, which goes by the name of "Het Paradis." We set up our three-legged stools against the walls of a neighboring *estaminet*, where we are sheltered from the wind, and then, with many interruptions, proceed with our work. There are several difficulties to contend with, the principal one being that our presence soon gets noised about in the neighborhood, and during certain hours of the day we are surrounded with crowds of children from a school near by, whose interest in our efforts remains unabated and unsatiated. I am the first object of attack, and am greeted with guttural welcomes in the Walloon dialect, and then my friend's presence being observed with cries of "ein andere" (another), they leave me in peace for awhile, but not for long, and confine their attention to him and his belongings. This is but a foretaste of what we may expect everywhere, when working out of doors, an interested crowd of idlers being always collected around us. The baptistery is built of stone, whereas the rest of the church, which is much earlier in date, is of brick, and being of an extremely ornate description, it does not look to have anything in common with the plain brick walls of the church in the background; but taken by itself it is a *multum in parvo* of architectural perfection. It was originally intended as a portal, and has four entrances which are now walled up.

A picturesque pile of building, with high-pitched roofs, to the left, is chiefly noticeable for its range of beautiful stone dormer windows (Fig. 3), with crocketed gablets, oval-shaped terminals, and stepped footstones, with a massive octagonal turret at the end. Formerly it was the residence of a wealthy old Bruges family, lately it has been used as a pawnbroker's establishment, here called a "Mont-de-Piété," and we hear that it is shortly to be converted into a museum of antiquities. Why a pawnshop should be called a Mount of Piety is an enigma I cannot attempt to unravel, and must leave it in your hands for solution. While busy here, an elderly gentleman who seems very much interested in our drawings gives us the information that if we cross the canal and turn up a little-used narrow foot-way, between some high buildings, we shall come to a façade well worthy of observation. We act on his suggestion, and find, fronting upon the canal, one of the most suggestive, and at the same time characteristic examples of Flemish work that we have yet met with. Unfortunately we cannot see it to advantage, and the only view we have from the end of the path leading up to the canal side is in very oblique perspective. A capital illustration of the building appears in Ernest George's book of etchings of Belgian architecture. The front to the water consists of two gable-ends, one much larger than the other, the larger one noticeable for several ranges of windows, one above another, having boldly-cusped heads, spanned on the top by a pointed arch having several orders of mouldings in brickwork, the lower ones spreading out into fantastic cusped and foliated tracery. The smaller gable is terminated by a square-shaped piece of brickwork, capped with stone coping in place of an ordinary saddle stone. This mode of treating a small dormer or gable is commonly metwith. It is as if a stepped gable were shorn of all the steps on either side except those at the springing and the solitary one at the top, the intermediate raking sides being coped with brickwork on edge, or having tabling in the ordinary manner. In this building, brick which has turned a mellow russet-brown color, with patches here and there of yellow lichen, and splashes of mossy green, is the material, and almost entirely, stone only being adopted for mullions, transoms, and a few lintels. In close proximity to the western portals of Notre Dame is the celebrated hospital of St. John, containing Hans Memling's masterpieces within its chapter-house.

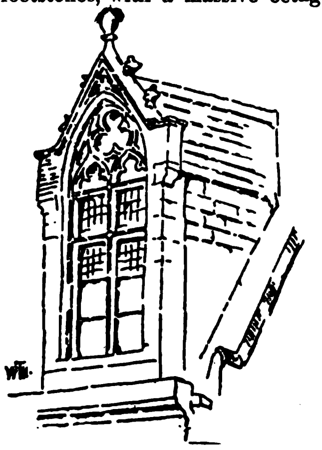

Fig. 3.

Time is too precious to spend over pictures, except as an occasional relaxation, so we jot down particulars of part of the front of the building facing the street, of red brick, as usual, with bays of mullioned and transomed windows (Fig. 4), quaint cusped brick tracery, the characteristic shouldered brick corbels to narrow the panelled recesses, Tudor arched doorways, and a dormer or two of the usual description.

Fig. 5. We must not leave Notre Dame without making mention of the fine tourelles of splendid proportions which flank its western gable end. They are circular on plan, enriched with attached brick shafts of small diameter, bound together at intervals with horizontal brick string-courses, dividing the surface into long vertical strips, finished at the top with stone capitals, the recessed spaces spanned with cusped arcadings. The spirelets are covered with slates, and are terminated by leaded maundrils or finials, the slate being tilted forward at the eaves in a slightly curved line. Lit up by the sun, the charm of these turrets is beyond description, and nothing can excel them for subtle effects of light and shade and wealth of artistic color. But we must not linger longer in Bruges, unwilling as we are to leave it, and must leave undescribed the Hôtel de Ville, the Palais de Justice, commonly called the Palais

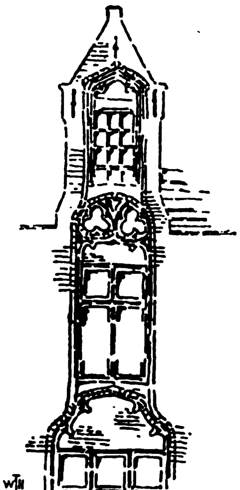

Fig. 4.

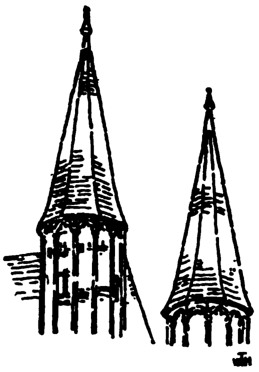

Fig. 5.

du France, with its magnificent carved chimney-piece and its turreted gable-ends facing the canal opposite the fish-market, also the Chapelle du Saint Sang, with its rich Flamboyant Gothic exterior. We vacate our room in which many happy hours have been spent sketching the belfry opposite, bid adieu to the buxom landlady, have a last word with François, our attentive and facetious waiter, who can speak a little English in a squeaky, high-pitched voice, and hasten to the station to catch the train for Ypres. We arrive there in the evening, and make our way to the principal inn in the place, the Hotel Tête d'Or, situated in Rue de Lille. It being rather dark, we have difficulty in seeing the buildings we pass, but are able to recognize the well-known Cloth Hall, with its fine tower, a visit to which we put off until the following day. Rising betimes in the morning, and breakfast being over, our landlord, who is somewhat of an antiquarian, hearing that we are architects, brings one or two valuable volumes relating to the antiquities of Ypres, and converses at considerable length. He can only talk in French, and as my knowledge of the language is somewhat limited, he has much the largest share in the conversation. Finding that we can appreciate the mediæval beauties of the place, he gets quite enthusiastic, and forthwith sends us out, under guidance of a hotel porter, to look round the Cloth Hall before the hours of admission are over. A description of the exterior of this building, which, no doubt, is well known to you by drawings and photos., is unnecessary, and it must suffice to say that the building is rather low, and is noticeable for its unbroken façade, 436 feet in length, with no recessed portions or projecting gables to give light and shade wherewith to relieve the monotony of effect. The wall surface is enriched with good decorated Gothic traceried windows and an elaborate parapet, but the most pleasing portions of the building, to my mind, are the fine tourelles at either end, and the splendid belfry tower which has provided a motif of design to more than one of our modern architects. The Salle des Mariages in the interior, although small, is of the most elaborate and ornate character, and has recently been restored in very good taste, regardless of expense. The room is vaulted in wood of a reddish-brown tint, the ribs being brought out tastefully in subdued color. The wall-space above a richly-carved linen-fold panelled dado is covered with fine frescoes, representing a visit of the Count of Flanders to Ypres. A fine open fireplace, with carved wooden canopy, occupies the centre of one side of the room, and at the end is a raised dais, on which are placed a long, narrow, carved black-oak table and some high-backed chairs, with antique stamped leather seats and backs. The great hall with open-timbered roof on the first floor, extending the whole length of the front, is now little used, but is interesting on account of the series of fresco paintings, of great merit, by Swerts and Guffens, on the walls opposite the windows, representing historical scenes in which Ypres has taken an important part. In its way, almost more picturesque than the Cloth Hall is a fine Early Renaissance building, carried on vaulted arcading abutting upon it, designed by Jan Sporeman, date 1575.

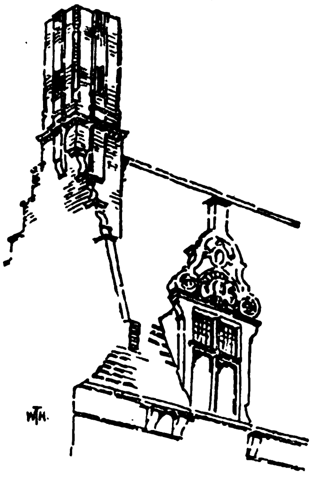

Fig. 6.

The quaint curvilinear gable ends (Fig. 6), decorated with strap-work ornament and carved arabesques, and the semi-circular panels above the first-floor range of mullioned and transomed windows, filled in with richly-carved cartouche work, are unique in their way, and some dormers in the rear, together with an ogee stepped gable-end, and a charmingly-designed chimney-stack, are not to be excelled for old world grace and mellow color imparted by the kindly hands of time. This building may be considered as one of the typical examples of Early Flemish Renaissance, and abounds in detail of the kind and quality which is being adopted in the present day by R. Norman Shaw, Ernest George, L. Peto, T. E. Collcutt, and one or two others, whose artistic predilections are well known.

Fig. 7.

It may here be remarked that this style of work is commonly called Queen Anne by an ignorant public, including many architects who ought to know better, who apparently are unable to detect the difference between the work of 1570 and that carried out in England nearly one hundred and fifty years afterwards. Taken as a whole, the buildings of Ypres are later in character than those of Bruges, and we do not see so much domestic Gothic work, although there are still one or two timbered houses to be seen, a fine example existing in the Rue de Lille, near our hotel, possessing a well-proportioned range of pointed traceried windows, and the remains of an elaborately-decorated parapet, with the springing of an angle-turret.

(*To be continued.*)

"BUILDING SUPERINTENDENCE."

Oswego, N. Y., July 9, 1883.

To the Editors of the American Architect: —

Sirs, — Do you intend to publish in book form the valuable series of articles on "Building Superintendence?"

This, with your series on "Builders' Scaffolding," would make a book of much practical value. Respectfully,

W. P. Judson, U. S. Asst. Engineer.

Buffalo, N. Y., July 9, 1883.

To the Editors of the American Architect: —

Dear Sirs, — Are the articles on "Building Superintendence" recently completed in the *American Architect* to be published in book form? It is very inconvenient to hunt up old numbers of the paper, and I have tried in vain to find a simple and practical book such as your articles would make if published.

It seems to me there would be no doubt of a book of the kind meeting with excellent success. Yours very truly,

G. F. H. Bartlett.

[The papers on "Building Superintendence" are to be published as soon as the series is completed. — Eds. American Architect.]

FACTORY CHIMNEYS.

Chicago, July 5, 1883.

To the Editors of the American Architect: —

Dear Sirs, — Can you refer me to any work on the subject of the construction of factory or boiler chimneys? Yours truly,

S. A. Treat.

BOOKS.

Indianapolis, Ind., June 31, 1883.

To the Editors of the American Architect: —

Dear Sirs, — Whose works could you advise as best for a superintendent to make monthly reports from, which would be accurate for plumbing, gas-fitting, and cut-stone, steam-heating, etc. You will greatly oblige by answering a reader. S. W.

[For plumbing work, W. P. Buchan's "*Plumbing*" may be useful, and for gas-fitting and steam-heating work Baldwin's "*Steam-Heating for Buildings*" would be the best book we know. Mr. Buchan's book costs about $1.00. It is one of Lockwood's Series, and can be had through any bookseller. Mr. Baldwin's book costs $2.50, and can be had through any bookseller, or of Wiley & Sons, New York. — Eds. American Architect.]

THE RESPONSIBILITIES OF ARCHITECTS.

Kansas City, Mo., July 2, 1883.

To the Editors of the American Architect: —

Gentlemen, — Through the columns of the *American Architect,* I should like to ask its many readers, if any of them can cite any decisions of the higher courts regarding the responsibility of architects. 1. Whether an architect as general superintendent is pecuniarily responsible for a building, although his drawings and specifications are correct, and he promptly rejects improper work and materials, and the contractor (of the owner's selection) proves to be incompetent and irresponsible, and refuses to make his work right? 2. Is an architect responsible for work done under a contract made by the owner, and rejected by the architect, and for which the owner pays, without the knowledge or consent of the architect? 3. Is an architect responsible for work done where the owner is to furnish certain materials and neglects to do so, although notified by the architect that such materials were necessary to make the job as set forth in his specifications? The work progresses partially before his own eyes, without said material and he pays for the same without the knowledge or consent of the architect. 4. Is an architect responsible where the work is proven by the architect and found correct and in accordance with contract, and he issues his certificate for the amount then due, and afterward the contractor changes this work without the knowledge or consent of the architect? S. E. C.

[There are not many decisions in this country respecting the responsibility of architects, but the most important of them may be found referred to in the papers on the "*Legal Responsibilities of Architects,*" published in Nos. 154 and 155 of this journal, together with other information on the subject. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Heidelberg. — The architects and engineers who are considering the proposed restoration of Heidelberg Castle have agreed upon certain general propositions. These are to so repair the Otto-Heinrich wing by roofing, propping, and internal strengthening as to make it capable of being actually used; to render the Friedrich IV wing accessible by means of sufficient repairs; to restore in the same way the Octagon Tower; to protect the Rudolf and Ruprecht wings by roofing; to carefully preserve the other towers in their present condition; to restore the Friedrich II wing, and to let the so-called English wing remain a ruin in its present state. In point of architectural style, it is agreed that the restorations shall conform strictly with the original, every admixture of modern ideas being carefully avoided. — *Exchange.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

280,785. DOOR. — James D. Benson and R. Bruce Fogle, Cranberry, W. Va.

280,793. PIPE-WRENCH. — A. Wells Case, South Manchester, Conn.

280,801. NAIL. — Henry S. Cushman, Milford, Mass.

280,808. WINDOW-SHADE ROLLER. — Benjamin F. Fox, Philadelphia, Pa.

280,831. DIVIDERS. — Carl Johnsen, Christiana, Norway.

280,841. ANGLE-IRON. — William Lorey, Philadelphia, Pa.

280,845. SCREW-DRIVER. — Angus McLellan, Portland, Oreg.

280,856. PAINT-MIXTURE FOR ROOFS AND OTHER PURPOSES. — Arthur G. Peuchen, Toronto, Ontario, Can.

280,877. DOOR-KNOB ATTACHMENT. — Oscar Stoddard, Cincinnati, O.

280,892. SASH-FASTENER. — William F. Bailey, St. Paul, Minn.

280,906. ELECTRIC FIRE-EXTINGUISHER AND FIRE-ALARM APPARATUS. — Charles E. Buell, New Haven, Conn.

280,908. HOT-WATER HEATING-APPARATUS. — William Burlingame, Exeter, N. H.

280,924. GONG-BELL. — William S. Foster, Richford, Vt.

280,928. HAND-SAW. — Herman F. Hoffmann, Torrington, Conn.

280,930. ORAL ANNUNCIATOR. — Joseph Ireland, Cleveland, O.

280,935. FASTENER FOR MEETING-RAILS OF SASHES. — Hiram T. King, Rochester, N. Y.

280,957. FIRE-ESCAPE. — George W. Looney, Sr., Rushville, Ind.

280,946. REMOVABLE BAY-WINDOW. — Charles A. Nordyke, Cincinnati, O.

280,950. FASTENER FOR MEETING-RAILS OF SASHES. — Geo. E. Parmelee, Circleville, N. Y.

280,957. FIRE-ESCAPE. — Joseph Ripczinski and Charles Tisch, Jr., Wausau, Wis.

280,987. SASH-FASTENER. — William H. Wolfrath, New York, N. Y.

281,016. SAFETY-STOP FOR ELEVATORS. — Felix P. Canfield, Boston, Mass.

281,027. VENTILATION. — William T. Cottier, Napa, Cal.

281,029. KILN AND FURNACE FOR BURNING BRICK, TILE, ETC. — James C. Culbertson and William A. Eudaly, Cincinnati, O.

281,036. LATCH. — Henry C. Doughty, Gray, and Daniel Hall, Auburn, Me.

281,054. DOOR-HANGER. — William Grace, Chicago, Ill.

281,082. APPARATUS FOR VENTILATING BUILDINGS AND CHIMNEY-STACKS. — Arnold W. Kershaw, Lancaster, County of Lancaster, England.

281,086. SPIRIT-LEVEL. — Samuel H. Lemon, New York, N. Y.

281,092. BUSH-HAMMER. — Henry D. Martin, Ypsilanti, Mich.

281,105. REAMING-SAW. — Geo. Meyer, New York, N. Y.

281,109. KNOB-LATCH. — John Milton, Hamilton, Va.

281,131. PAINT-COMPOUND. — Arthur G. Peuchen, Toronto, Ontario, Can.

281,133. DRAIN-TILE DITCH-LEVEL. — Lyman F. Pontious, Adair, Ill.

281,135. STONE-CHANNELING MACHINE. — Almire H. Rapp, Paris, France.

281,136. FIRE-ESCAPE. — Henry Reusch, Quincy, Ill.

281,142. DOOR-LOCK. — Joseph Savoie, St. Marcel, Quebec.

281,148. PNEUMATIC DOOR-OPENER. — Adolph T. Smith, New York, N. Y.

281,154. FIRE-ESCAPE. — Edward Solomons, Sumter, S. C.

281,169. FIRE-EXTINGUISHER. — Caleb C. Walworth, Boston, Mass.

281,181. AUTOMATIC FIRE-EXTINGUISHER. — Christopher L. Delmage, Woonsocket, R. I.

281,198. FIRE-PROOF SHUTTER. — Robert P. Manly, Philadelphia, Pa.

281,211. STONE-DRESSING MACHINE. — John T. Turner, Sing Sing, N. Y.

281,217. HAMMER. — Heinrich Wiedmann, Nuremberg, Germany.

281,219. HEATING-DRUM. — Henry G. Williams, Jersey City, N. J.

SUMMARY OF THE WEEK.

Baltimore.

ADDITION. — Two-st'y brick, with stone finish, Sunday-school room to Franklin Square Baptist Church, Calhoun St., near Lexington St., 20′ x 60′, and to cost $2,500; from designs of Messrs. J. A. & W. T. Wilson, architects; H. C. Smyser, builder.

BUILDING PERMITS. — Since our last report fourteen permits have been granted, the more important of which are the following: —

Dreide & Bro., two-st'y brick building, w s Swan Alley, between Bank St. and Eastern Ave.

Chas. E. Willis, 9 three-st'y brick buildings, w s Mount St., commencing s w cor. Saratoga St.; and 10 two-st'y brick buildings, e s Bruce St., commencing s e cor. Saratoga St.

S. Kahn, 2 three-st'y brick buildings, Nos. 154 and 156 Broadway, e s, between Eastern and Canton Aves.

Antonie Carter, two-st'y brick building, n e cor. Fort Ave. and Hull St.

Wm. G. Wamsley, 6 two-st'y brick buildings, w s Ann St., s of Biddle St.

Boston.

BUILDING PERMITS. — *Brick.* — *Madison Court*, opp. Mechanics St., Ward 22, for Gasspriena Hansen, dwell. and store, 27′ x 32′, one-st'y flat; David Angell, builder.

Jackson Court, rear, near Dorchester Ave., Ward 15, for Lawrence H. Daloz, cleaning-house, 15′ x 20′, one-st'y flat; Ira A. Medbery, builder.

Bromfield St., Nos. 7–9, Ward 10, for Alpheus Bigelow heirs, offices and stores, 24′ 7″ x 32′, four-st'y flat; ell, 13′ x 26′ 3″; J. E. Stuart, builder.

Hamilton Pl., Ward 10, for W. S. Dexter, Trustee, offices and stores, 76′ 9″ and 75′ 8″ x 80′, six-st'y flat; Neal & Preble, builders.

Marlborough St., No. 272, Ward 11, for N. S. Bartlett, dwell., 26′ x 68′, four-st'y mansard; D. Connery, builder.

Elm Pl., Nos. 3–4, Ward 7, for A. D. Puffer, manufacture soda water, 39′ 6″ x 50′ 6″, four-st'y mansard.

Claremont Park, Nos. 24 *and* 26, Ward 18, for John Carlton, 2 dwells., 18′ x 45′, three-st'y flat, John Carlton, builder.

Crescent St., near Hadley St., Ward 4, for Horatio Williams, 2 dwells., 25′ x 52′, two-st'y mansard, Horatio Williams, builder.

Wood. — *Parker St.*, near Hadley St., Ward 4, 2 dwells., 25′ x 52′, two-st'y mansard; Horatio Williams, builder.

Putnam St., No. 161, Ward One, for Eugene Luippold, dwell., 17′ 6″ x 18′ and 14′ x 14′, two-st'y flat; J. C. Frame, builder.

Ashland St., near Albion St., Ward 23, for Wm. A. Davis, dwell., 22′ and 27′ x 29′, one-st'y pitch; Enoch A. Carter, builder.

Jamaica St., near Carter St., Ward 23, for Wm. Kelley, dwell., 22′ x 29′; two-st'y pitch; John Gately, builder.

Granville Pl., near Brook Ave., Ward 20, for Guy A. Clifford, dwell., 19′ x 28′ and 13′ x 14′, two-st'y pitch; Guy A. Clifford, builder.

Brooks Ave., near West Cottage St., Ward 20, for Guy A. Clifford, dwell., 30′ 6″ x 31′, two-st'y pitch; Guy A. Clifford, builder.

Cottage St., near Humphrey St., Ward 20, for Nathaniel Bolden, dwell., 35′ 6″ x 36′ and 14′ x 23′, two-st'y pitch; Edw. McKechnie, builder.

Boylston Ave., near Green St., Ward 23, for Patrick Magee, dwell., 22′ x 30′, two-st'y pitch; Dugald McDonough, builder.

West Fifth St., Ward 13, for James V. Devine, 5 dwells., 20′ x 32′, three-st'y flat; James V. Devine, builder.

Erie Ave., near New Seaver St., Ward 24, for W. H. Wallace, 2 dwells., 16′ x 35′, three-st'y flat; John H. Gigie, builder.

Bower St., Nos. 59 *and* 61, near Laurel St., Ward 21, for Anna W. Flint, 2 dwells., 27′ 6″ and 29′ 6″ x 45′, two-st'y flat; Thomas J. Tobin, builder.

Blue Hill Ave., Ward 23, for Highland Railway Co., passenger station, 40′ x 40′, one-st'y hip; G. W. Woods, builder.

Temple St., Ward 23, for Frank E. Smith, dwell., 22′ x 33′, two-st'y pitch; J. Wason, builder.

Jarvis Place, near George St., Ward 20, for F. J. Portunato, mechanical, 22′ x 30′, two-st'y pitch; F. J. Portunato, builder.

Sigourney St., near Glen Road, Ward 23, for S. G. Thaxter, dwell., 32′ 4″ x 34′ 4″, two-st'y pitch; J. L. Batcheldor, builder.

Tremont St., Ward 24, for E. F. Petersilea, dwell., 12′ x 14′ and 22′ x 28′, two-st'y pitch; F. Hopkins, builder.

West Cottage St., Ward 20, for Silas Potter, 2 dwells., 20′ 6″ x 58′; three-st'y hip.

Heath Pl., Ward 22, for Cornelius Van Der Wall, dwell;, 21′ x 30′, two-st'y pitch; C. J. Pennick, builder.

West Fifth St., near D St., *Nos.* 139 *and* 141, Ward 13, for Bridget Brady, 2 dwells., 22′ x 34′, three-st'y flat; Wm. T. Eaton, builder.

Gaston St., rear, near Warren St., Ward 21, for Thomas F. Furber, stable, 31′ x 39′, one-st'y mansard.

Anawan Ave., near Beach St., Ward 23, for Henry Schulenkorf, dwell., 21′ and 24′ x 26′, and 19′ x 19′, two-st'y pitch; G. F. Renney, builder.

Milton St., near Granite Ave., Ward 24, for John Lawled, green-house, 12′ x 100′, one-st'y pitch; Granville Spear, builder.

Washington St., rear, near Keyes St., for Boston Thread & Twine Co., storage of flax, 25′ x 34′, one-st'y pitch; C. H. Lewis, builder.

Waverly St., south side, Ward 25, for Charles W. Sanderson, dwell., 10′ x 18′ and 22′ x 30′, three-st'y pitch; J. C. Wadleigh.

Richmond St., near Pope St., Ward 24, for James Pope, owner and builder, 4 dwells., 19′ x 27′, two-st'y pitch.

Grove St., rear, near Dedham line, Ward 23, for Association Tiphareth Israel, tool-house, 16′ x 22′, one-st'y pitch; G. Galef, builder.

Neponset Ave., near Taylor St., Ward 24, for Patrick and Michael Finnigan, dwell. and store, 24′ x 30′, two-st'y flat; Michael Ryan, builder.

Brooklyn.

BUILDING PERMITS. — *Fourth Ave.*, n e cor. Fifty-fourth St., two-st'y frame dwell., tin roof; cost, $3,500, owner, Mrs. M. A. Moss, Pearl St., New York; architect, T. Engelhardt; builder, J. Rueger.

Gwinnett St., No. 138, s s, 140′ e Harrison Ave., three-st'y frame double tenement, tin roof; cost, $3,600; owner, Anton Miller, 30 St. Marks Pl.; architect, E. Schrempf; builder, J. Schoch.

North Henry St., No. 37, w s, 40′ s Herbert St., three-st'y frame double tenement, tin roof; cost, $3,800; owner, August Winkler, 33 North Henry St.; architect, J. Moesner; builder, J. Schoch.

Broadway, Nos. 305 *to* 311, 4 four-st'y brick stores and tenements, tin roofs, iron cornice; cost, each, $8,500; owner, John McCormick, 277 South Fourth St.; architect, A. Herbert; builders, W. & T. Lamb and Jenkins & Gillies.

Quincy St., n s, 287′ e Tompkins Ave., 2 two-st'y brownstone front dwells., tin roofs; cost, each, $4,000; owner, G. De Revere, 663 Greene Ave.

Chauncey St., s s, 100′ w Ralph Ave., 2 two-st'y frame dwells., gravel roofs; cost, each, $2,500; owner, architect and builder, Baldwin Pettit, 285 Chauncey St.; mason, E. Satterline.

Clifton Pl., No. 275, n s, 275′ w Nostrand Ave., two-st'y brick dwell., with one-st'y extension, tin roof; cost, $3,100; owner, architect and builders, John J. Cyphers, 355 Kent Ave.

Greene Ave., s s, 248′ e Grand Ave., 2 two-st'y basement and attic brownstone front dwells., metal roofs; cost, each, $3,500; owner and builder, Elbert Snedeker, 391 Greene Ave.

Greene Ave., s s, 152′ e Grand Ave., 4 four-st'y brick flats, metal roofs; cost, each, $12,000; owner, etc., same as last.

Eagle St., No. 89, n s, 175′ e Franklin St., three-st'y frame tenement, tin roof; cost, $3,350; owner, Mrs. Shaar, on premises; architect, F. Weber; builders, —— Hafford and Post & Walker.

Eagle St., No. 87, n s, 150′ e Franklin St., three-st'y frame double tenement, tin roof; cost, $3,500; owner, —— Kenney, on premises; architect, F. Weber; builders, —— Hafford and Post & Walker.

Johnson St., s s, 40′ w Raymond St., three-st'y brick tenement, tin roof; cost, $3,500; owner, P. Barrett, Navy St., cor. Raymond St.; architect, F. Ryan.

Lafayette Ave., n s, 60′ e Stuyvesant Ave., two-st'y and basement brick tenement, tin roof; cost, $4,500; owner, H. C. Fortmeyer, Lafayette Ave., cor. Stuyvesant Ave.; architect, H. J. Growtage.

Wallabout St., n s, 150′ w Harrison Ave., two-st'y frame dwell., tin roof; cost, $3,000; owner, —— Glaeser, Morrell St., cor. Debevoise St.; architect, —— Hildebrant; builder, J. Rueger.

Morrell St., e s, 75′ n Debevoise St., two-st'y frame store and dwell., tin roof; cost, $3,000; owner, David Hood, Morrell St., cor. Debevoise St.; architect, G. Hillenbrand; builders, G. Welsch and J. Rueger.

Fourth Ave., s w cor. Eighth St., 3 three-st'y brick stores and tenements, gravel roofs; cost, each, $4,000; owner, Geo. Harvey, Luzerne, Greene Co., New York; architect and builder, Theo. Pearson.

Broadway, Nos. 707 *and* 711, about 50′ n w Park Pl., three-st'y brick building for stores, etc., with two-st'y extension, tin roof; cost, $13,000; owner, Amancio Rodrigues, 19 Whipple St.; architect, T. Engelhardt; builder, J. Rueger.

Tenth St., n s, 80′ e Sixth Ave., two-st'y and basement brownstone front dwell.; tin roof; cost, $4,300; owner and builder, Geo. Wessel, Sixth Ave., cor. Tenth St.; architect, L. J. Wells.

Nineteenth St., n s, 168′ w Sixth Ave., 5 two-st'y frame tenements, tin roofs; cost, each, $2,000; owner, architect and builder, Bernard Casper, 397 Fourteenth St.

Pearl St., w s, 237′ s Concord St., three-st'y brick stable and storage building, tin roof; cost, $9,000; owners, Dixon & Wilson, 290 Fulton St.; architect, J. G. Glover; carpenter, J. S. McRae.

Bushwick Ave., n s, 25′ w Varet St., three-st'y frame double tenement, tin roof; cost, $4,000; owner, L. Hoffmann; architect, F. Hahnberg.

Ross St., s s, 236′ w Wythe Ave., two-st'y brick factory, gravel roof; cost, $4,000; owner, Oscar F. Hawley, 105 Bedford Ave.; architect, E. F. Gaylor; builders, W. & T. Lamb, Jr.

Floyd St., n e cor. Throop Ave., three-st'y frame tenement, tin roof; cost, $3,100; owner, Louis Weil, 199 Throop Ave.; architect and builder, H. Loeffler.

Clifton Pl., n s, 225′ e Classon Ave., two-st'y and basement brick dwell., gravel roof; cost, $4,500; owner and builder, Daniel Boyle, 125 Clifton Pl.; architect, M. J. Morrell.

Broadway, e s, 45′ n Suydam St., three-st'y frame store and dwell., tin roof; cost, $3,700; owner, Wm. Stewart, 13 Lawton St.: architect and builder, W H. Nicolls; mason, S. V. Hyer.

Wallabout St., No. 376, three-st'y frame double tenement, tin roof; cost, $4,200; owner, A. Meth, 374 Garet St.; architect, A. Herbert; builder, F. Kuehne.

Leonard St., w s, 50′ s Powers St., three-st'y frame dwell., tin roof; cost, $4,000; owner, Edward J. Carroll, 32 Jackson St.; architect, E. F. Gaylor; builders, J. Lahey and J. J. Brennan.

Reid Ave., n e cor. Van Buren St., three-st'y brick store and tenement, tin roof; cost, $8,000; owner, Mrs. J. M. Lobart, on premises; architect and builder, H. J. Brown; masons, Ashfield & Son.

Fourth Ave., n w cor. Eighth St., three-st'y brick store and tenement, gravel roof; cost, $4,000; owner, Geo. Harvey, Luzerne, Green Co., New York; architect and builder, T. Pearson.

South Tenth St., between Third and Fourth Sts., four-st'y brick tenement, tin roof, metal cornice; cost, $12,500; owner, Wm. Grundy, Wilson St.; builder, Thos. Gibbons.

Suydam St., n w cor. Central Ave., three-st'y frame store and double tenement, tin roof; cost, $4,500; owner, Herm Schultz, Central Ave.; architect, T. Engelhardt.

Olive St., No. 29, w s, 75′ n Ainslie St., three-st'y frame double tenement, tin roof; cost, $4,200; owner, Stephan Hodum, on premises; architect, T. Engelhardt; builders, L. Fuchs and C. Hoffmann.

Tenth St., s s, 300′ e Fifth Ave., 2 two-st'y and basement brick dwells., gravel roofs; cost, each, $4,500; owner, Mrs. O'Brien: architect and builder, T. Corrigan; mason, W. Corrigan.

Ellery St., n s, 125′ e Delmonico Pl., 2 three-st'y frame tenements, tin roofs; cost, each, $4,200; owner, Wm. Kolb, Ellery St., near Delmonico Pl.; archi-

tect, T. Engelhardt; builders, J. Kuhn and J. Kueger.

Lewis Ave., e s, 40′ s Van Buren St., 2 two-st'y brownstone front dwells., tin roofs; cost, total, $10,000; owner, architect, and builder, M. J. McLaughlin, 10 Kosciusko St.

Hall St., No. 119, e s, 224′ n Myrtle St., two and-one-half st'y brick dwell., tin roof; cost, $4,000; owner, Jno. I. Godby, 117 Hall St.; architect, T. Hanlon; builders, Lynch & Gormley and T. Hanlon & Son.

South Second St., n s, about 100′ from First St., extending westerly to the East River, three-st'y brick storehouse, gravel and paper roofing; cost, about $15,000; owner, Brooklyn Sugar Refining Co., First St. and South Second St.

Fifth Ave., n w cor. Sackett St., 2 three-st'y brick stores and flats, tin roofs; cost, total, $18,000; owner, Jacob Berg, 94 Fifth Ave., architect, I. D. Reynolds.

Reid Ave., w s, 20′ s Van Buren St., 5 two-and-one-half-st'y brownstone front dwells., tin roofs; cost, each, $4,000; owner and builder, Edward Webb; architect, W. Godfrey.

Quincy St., s s, about 100′ e Stuyvesant Ave., two-st'y brownstone front dwell., tin roof; cost, $4,500; owner, Wm. Tartor, Quincy St.; builder, J. W. Stewart.

Hart St., s s, 285′ w Stuyvesant Ave., 2 two-st'y frame tenements, tin roofs: cost, each, $2,800; owner and builder, Wm. A. Schmitthenner, 390 Hart St.; architect, J. Herr.

South Ninth St., n s, 150′ e First St., five-st'y brick factory, tin roof; cost, $7,000; owner, Wm. Vogel, South Ninth St., near First St.; architect, E. F. Gaylor; builders, J. Rodwell and J. Meyding.

Raymond St., w s, 97′ 1″ n De Kalb Ave., two-st'y brick stable and dwell., tin roof; cost, $7,000; owner, A. H. Boombs, 14 Portland Ave.; architect, W. A. Mundell; builders, T. B. Rutan, and L. W. Seaman, Jr.

Greene Ave., n s, 240′ e Throop Ave., 14 two-st'y brownstone front dwells.; cost, each, $6,500; owner, architect, and builder, Jno. F. Ryan, 187 Hewes St.

Alteration. — *Lafayette Ave.*, n w cor. North Elliott Pl., four-st'y brick extension, tin roof, interior and rear of present building altered; also, new roof; cost, $9,000; owner, Chas. Kornder, 819 Fulton St.; architect, C. F. Eisenach; builders, Ashfield & Son and W. Zang.

Cincinnati.

Building Permits. — John Goke, three-st'y brick dwell., 139 East Front St.; cost, $6,500.

Butchers' Meeting Association, one-st'y brick build., cor. Findlay St. and Central Ave.; cost, $3,500.

H. Kempe, three-st'y brick dwell., 140 Betts St.; cost, $5,000.

Este Estate, three-st'y brick dwell., 351 Main St.; cost, $3,500.

A. Lowbitz, two-st'y brick dwell., Wheeler St., near Vernon St.; cost, $3,500.

John Houcke, three-st'y brick dwell., Central Ave., near Poplar St., cost, $5,000.

Josephine Ward, two-st'y brick dwell., 312 Central Ave.; cost, $6,000.

W. M. Van Bant, 4 three-st'y brick dwells., Longworth St., near Smith St.; cost, $3,500.

Henry Whittaker, three-st'y brick dwell., Sherman Ave., near Western Ave.; cost, $4,500.

Smith, Meyers & Co., three-st'y brick build., Front St., near Smith St.; cost, $12,000.

John McVain, 2 three-st'y brick dwells., 34 Pike St.; cost, $5,000.

Mrs. Ella K. Platt, 4 one-st'y frame dwells; cost, $4,500.

18 permits for repairs; cost, $20,000.

Total permits to date, 510.

Total cost to date, $1,878,950.

For same time last year the total permits were 414, and total cost $1,073,900.

Chicago.

Flats. — C. L. Stiles, architect, has completed plans for three-st'y flats, at No. 500 West Madison St., for Mrs. L. Burroughs, 24′ front, of white and Bedford stone; cost, $8,000.

Houses. — Mr. Geo. S. Spohr is architect of 2 two-st'y houses for Dr. Case, to be built on Seminary Ave.; cost, $6,000.

Also, by same architect, house for James Sullivan, n e cor. of Wells and Whiting Sts., two-st'y; to cost $7,000.

School-House. — Messrs. Bauer & Hill are architects for school-house, cor. West Indiana and Paulina Sts., pressed-brick and stone finish, three-st'y, 73′ x 85′ 6″; cost, $40,000.

Building Permits. — T. H. Gault, 4 three-st'y and basement dwells., Congress St.; cost, $12,000; architects, Dexson & Townsend; builder, T. H. Gault.

Eich Bros., 3 two-st'y dwells., 1094–1098 West Monroe St.; cost, $9,000; architect, Wm. Strippleman; builder, R. E. McKay.

Eich Bros., 3 two-st'y dwells., 1089–1093 West Monroe St.; cost, $9,000; architect, Wm. Strippleman; builder, R. E. McKay.

James Sullivan, three-st'y and basement dwell., 298 North Wills St.; cost, $4,100; architect, E. Spohr; builder, Martin Zipprich.

U. P. Smith, two-st'y dwell., 3108-3210 Groveland Park Ave.; cost, $6,000; architects, Wheelock & Clay; builder, Chas. Buteker.

U. P. Smith, two-st'y dwell., 3214 Lake Park Ave.; cost, $6,000; architects, Wheelock & Clay; builder, Chas. Buteker.

U. P. Smith, 2 two-st'y dwells., 3263-3265 Groveland Park; cost, $12,000; architects, Wheelock & Clay; builder, Chas. Buteker.

Mrs. L. K. Smith, two-st'y dwell.; cost, $30,000; architects, Cobb & Frost; builders, Clark & Fuller.

Chas. Hottinger, four-st'y flats, 312–314 Sedgwick St.; cost, $15,000; architects, Furst & Rudolph; builder, Leo Kaboll.

Wm. Schroeder, two-st'y dwell., 699 North Park Ave.; cost, $5,000; architect, W. H. Arent; builder, N. Gerten.

G. Thompson, two-st'y dwell., 334 Hubbard St.; cost, $3,000.

W. A. Fuller, additional story, 116–118 La Salle St.; cost, $18,000; builder, C. Busby.

O. De Luce, two-st'y dwell., 195 California Ave.; cost, $5,000.

Wm. Jackson, 3 three-st'y dwells., 3111–3115 Forest Ave.; cost, $10,000; architect, H. P. Harned.

E. Saltsman, two-st'y dwell., 3350 Calumet Ave.; cost, $6,000; architect, J. R. Willet; builders, Agnew & Cox.

D. A. Titcomb, 2 two-st'y dwells., 42 and 44 Spruce St.; cost, $6,000; architect, W. B. Hunter; builders, Agnew & Cox.

Geo. Righeimer, three-st'y store and flats, 23′ x 77′, 480 Union St.; cost, $7,500.

Hewting & Crewhurst, 3 cottages, 3221–3225 Wallace St.; cost, $3,600.

H. Wilke, three-st'y dwell., 431 Lincoln St.; cost, $4,000.

Schobinger & Grant, additional story, 2101 Indiana St.; cost, $5,000; architect, N. L. Beers; builder, H. White.

Chas. Vennard, two-st'y and basement flats, 790 Carroll Ave.; cost, $3,000.

M. McAuley, two-st'y and basement store and dwell., 3109 Halsted St.; cost, $6,000.

Peter Schoenhoffen, two-st'y flats, 2506 Prairie Ave.; cost, $10,000.

American Varnish Manufacturing Co., two-st'y factory, 309 to 315 North Branch St.; cost, $6,000; architect, Rehnoldt; builder, Fred Hanson.

P. M. Cardy, two-st'y store and dwell., 927 North Halsted St.; cost, $5,000.

Wm. Scott, two-st'y dwell., 855 Adams St.; cost, $4,200.

L. Burlingham, four-st'y and basement stores and flats, 351 and 353 North Clark St.; cost, $20,000; architect, A. Smith; builder, J. G. Ditz.

Helen P. Hubbard, three-st'y and basement dwell., 377–379 Elm St.; cost, $14,000; architects, Treat & Foltz; builder, Jno. Martin.

L. Huck, malt-house, 57 to 61 Eighteenth St.; cost, $4,000.

F. Klotz, two-st'y and basement flats, 386 Maxwell St.; cost, $3,000.

P. G. Dodge, two-st'y and basement dwell., 21′ x 71′, 3117 Forest Ave.; cost, $8,000; architects, Dixon & Townsend.

Rev. P. Rierdon, two-st'y and basement school-house, Wabash Ave.; cost, $18,000; architect, J. J. Eagan; builder, Jas. Cownley.

J. W. Kindt, two-st'y dwell., 383 Mohawk St.; cost, $3,500.

Mrs. B. Heffron, two-st'y and basement flats, 1474 Indiana Ave.; cost, $3,000.

H. Ridlick, three-st'y factory, Oak St.; cost, $6,000.

S. D. Staubro, 2 two-st'y and basement dwells., Ashland Ave.; cost, $18,000; architects, Van Osdell & Co.; builder, S. S. Seick.

J. D. McNab, three-st'y and basement store, 200 Michigan St.; cost, $11,000.

Mrs. E. Lordner, two-st'y and basement dwell., Centre Ave.; cost, $4,500.

F. Holz, two-st'y flats, 111 Jay St.; cost, $3,200.

F. Weber, three-st'y and basement dwell. and store, 521 and 523 Halsted St.; cost, $16,000; architects, Furst & Rudolph; builder, Henry Appel.

John Kruse, two-st'y store and dwell., 338 May St.; cost $3,000.

Rev. Thos. Burke, three-st'y and basement school-house, 5 to 11 Rumsey St.; cost, $25,000; architects, Bauer & Hill; builders, J. M. Dumphy & Co.

Thos. Enright, three-st'y and basement store and dwell., 371 and 373 Thirty-first St.; cost, $12,000.

A. W. Adcock, two-st'y and basement dwell., Warren Ave.; cost, $6,000; architects, Dixon & Townsend.

C. F. Yerkes, two-st'y barn, 243 Thirty-second St.; cost, $4,000.

Joseph Mansky, three-st'y dwell., 146 Pacific Ave.; cost, $6,000.

F. Kouffman, three-st'y and basement store and dwell., 293 Lincoln Ave.; cost, $10,000.

M. McFadden, three-st'y store and dwell., 3436 Halsted St.; cost, $3,300.

A. Hogue, two-st'y and basement addition; cost, $3,000.

C. & N. W. R. R. Co., two-st'y warehouse; cost, $5,000.

Wm. R. Baker, three-st'y flats, 211 South Sangamon St.; cost, $6,000.

D. Mahon, three-st'y and basement flats, 103–105 Walton Pl.; cost, $12,000.

M. Schmitts, three-st'y and basement dwell., 547 Larrabee St.; cost, $7,000.

Mrs. Baldwin, two-st'y store and flats, 658–660 Madison St.; cost, $7,000.

Wm. Burmeister, two-st'y and basement factory, 776–778 Clybourn Ave.; cost, $3,000.

Mrs. M. E. Rich, two-st'y dwell., 407 Warren Ave.; cost, $5,000.

Detroit.

Building Permits. — The following permits costing over $4,000 have been granted since our last report.

Topping & Fisher, block of 4 three-st'y brick dwells., Nos 121–7 Alfred St.; cost, $20,000.

Joseph Guton, frame store, Tremont St.; cost, $7,500.

A. C. Varney, brick house, Edmund St.; cost, $10,000.

A. C. Varney, 3 brick houses, Macomb Ave.; cost, $17,000.

A. C. Varney, brick house and barn, No. 259 Putnam Ave.; cost, $5,000.

A. C. Varney, brick house, Canfield Ave.; cost, $6,000.

John Finn, brick house, Garfield Ave., No. 82; cost, $4,400.

Woodward Ave., block of 4 stores; cost, $28,000; A. G. Holland, contractor.

New York.

Flats. — On the n w cor. of First Ave. and Eighty-eighth St., 2 five-st'y flats, brick, with stone and terra-cotta finish, 50′ 8½″ x 96′ and 50′ x 83′, for Mr. Thos. Patten and Mrs. M. C. King, respectively, are to be built from designs of Mr. Geo. Martin Huss.

Four four-st'y brownstone flats, 25′ x 68′ each, are to be built on the north side of One Hundred and Twenty-seventh St., between Sixth and Seventh Aves., by Mr. C. Bomckamp.

Stables. — For Mr Chas. Miller, a stable, 25′ x 86′, with apartments above, is to be built at No. 26 West Forty-fourth St., at a cost of about $20,000, with a brick and terra-cotta front, from designs of Mr. E. Gandolfo.

For the Edward Clark Estate, a three-st'y stable, 50′ x 212′, is to be erected on the cor. of Broadway and Seventy-fifth St., at a cost of about $50,000. It is to be in connection with the "Dakota," and is to be built of brick, with terra-cotta finish; Messrs. C. W. Romeyn & Co. are the architects.

Messrs. M. G. & G. A. Reusens are to have built, from designs of Mr. R. Mook, 2 three-st'y brick and granite stables, 25′ x 65′ each, on the south side of Fifty-sixth St., 270′ e of Seventh Ave., to cost about $40,000.

Stores. — On the east side of Greene St., n of Grand St., 2 six-st'y stores, 85′ x 100′, with iron fronts, to cost about $100,000, are to be built for Messrs. G. Schwab & Bros., from designs of Mr. Richard Berger.

Office-Building. — It is now announced that the cost of the "Potter" building, on Park Row, will be about $700,000. Mr. N. G. Starkweather has perfected the plans of the building, which will be eleven stories high, the first two being iron, and the upper ones brick, with terra-cotta finish.

Alteration. – The box-office of the Madison Square Theatre is being altered and improvements to be made, at an expense of about $3,000, from designs of Messrs. Kimball & Wisedell.

Building Permits. — *Sixth Ave.*, n e cor. One Hundred and Twenty-second St., 5 three-st'y and mansard brick dwells., slate and tin roofs; cost, each, $20,000; owner, Jno. H. Sherwood, One Hundred and Fifteenth St., cor. Sixth Ave.; architect, J. E. Terhune; builders, E. Vreeland & Van Doran.

One Hundred and Seventeenth St., n s, 275′ e Second Ave., 3 five-st'y brownstone front tenements, tin roofs; cost, each, $21,000; owner, Wm. Henderson, 511 East Eighty-second St.; architect, John C. Burne.

Tenth Ave., s w cor. Twenty-first St., 4 four-st'y brick tenements and stores; cost, total, $60,000; owner, Clinton Sutphen, 20 Nassau St.; architect, Geo. B. Pelham.

Pitt St., No. 121, five-st'y brick tenement and stores, tin roof; cost, $14,000; owner and builder, Peter Schaeffler, 96 Second Ave.

West St., 25′ s Houston St., three-st'y brick mission-house, slate roof; owner, Protestant Episcopal Missionary Society, by John Davenport, 218 West Thirty-eighth St.; architect, Alfred H. Thorp; builder, Terence Kiernan.

One Hundred and Twenty-fourth St., s e cor. Fourth Ave., 3 five-st'y brick flats, tin roofs; cost, each, $20,000; owner, Geo. H. Rogers, 327 East One Hundred and Twenty-fifth St.; architects, Cleverdon & Putzel.

West Forty-fourth St., No. 26, three-st'y brick stable, tin roof; cost, $20,000; owner, Chas. Miller, 14 East Forty-fourth St.; architect, Emanuel Gandolfo.

Fifth Ave., s w cor. Twenty-third St., seven-st'y and basement brick and stone office-building, slate and tin roof; cost, $100,000; owners, Western Union Telegraph Co., 195 Broadway; architect, H. J. Hardenbergh; builders, Jas. G. Smith & Prodgers.

Sixth Ave., w s, between One Hundred and Thirtieth and One Hundred and Thirty-first Sts., 4 three-st'y brick dwells., slate and tin roofs; cost, $20,000 to $25,000; owner, H. M. Blasdell; architects, Lamb & Rich.

East Seventeenth St., No. 231, four-st'y brick dwell., slate and tin roof; cost, $28,000; owners, St. John Baptists Foundation, Francis H. Weeks, Treasurer, 11 East Twenty-fourth St.; architect, Chas. C. Haight; masons, Robinson & Wallace; carpenter, not selected.

Second Ave., s w cor. Ninety-ninth St., five-st'y and basement brick factory, tin roof; cost, $20,000; owner, Alphonso Beaudet, 135 Manhattan Ave., Brooklyn; architect, J. H. Valentine; builders, J. O'Hare and Steinmetz & Beaudet Bros.

Second Ave., w s, 42′ s Ninety-ninth St., 2 five-st'y brick tenements and stores, tin roofs; cost, each, $20,000; owner, architect and builders, same as last.

One Hundred and Twenty-seventh St., n s, 130′ e Second Ave., 2 four-st'y brick tenements, tin roofs; cost, each, $10,000; owner, Chas. H. Barton, 111 West One Hundred and Thirty-third St.; architect, J. H. Valentine; builder, W. O. Barton.

West Sixty-first St., No. 532, five-st'y brick tenement, tin roof; cost, $14,000; owner, Patrick O'Reilly, 534 West Sixty-first St.; architect, J. Kastner.

Third Ave., n w cor. One Hundred and Thirty-fifth St., four-st'y brick tenement and store, gravel roof; cost, $9,000; owner, Martin Norz, Third Ave.; cor. One Hundred and Forty-fourth St.; architect, H. S. Baker; builders, Jas. M. Lacost and Ed. Gustaveson.

One Hundred and Sixth St., n s, and *One Hundred and Seventh St.*, s s, from Ave. A westerly, and across rear of lot, 3 frame stone-cutter sheds, gravel roof; owner, Robinson Gill, Sixty-fifth St., near First Ave.

Seventy-second St., n s, 100′ e Tenth Ave., 10 four-st'y brownstone front dwells., tin roofs; cost, each, $25,000; owners and builders, James R. Smith, 47 West Thirty-ninth St., and C. W. Luyster, 237 West Fifty-third St.; architects, D. & J. Jardine.

Eleventh Ave., No. 452, five-st'y brick tenement, tin roof; cost, $10,000; owner, Edward Joyce, 556 West Thirty-seventh St.; architect, C. F. Ridder, Jr.

Twentieth St., n s, 275′ w Tenth Ave., 5 four-st'y brick tenements, tin roofs; cost, each, $12,000; owner. Clinton Sutphen, 20 Nassau St.; architect, Geo. B. Pelham.

One Hundred and Seventeenth St., n s, 373′ e Ave. A, 3 four-st'y brick flats, tin roofs; owner, Geo. W. Moore, London, Eng.; architect, Jas. E. Ware.

One Hundred and Eighteenth St., s s, 373′ e Ave. A, 2 four-st'y brick flats, tin roofs; owner and architect, same as last.

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CONTENTS.

SOME of our readers may remember that we gave in these columns not long ago a little history of the competition for the proposed State Capitol at Denver, including an account of the strange discovery by the Commissioners, after all the designs were in, that the programme drawn up for the guidance of competitors was ill-considered and worthless; with a mention of the subsequent peregrinations of the Commissioners in search of knowledge about the subject, and their return, filled with the consciousness of duty performed, and eager to remedy the error which they had discovered, by calling an extra session of the Legislature to repeal the original programme, and substitute a less objectionable one. As an extra session could only be called by the Governor of the State, the Commissioners appealed to him to carry out their wishes, entertaining no doubt of his compliance, but it seems that he, either considering that the seventy-five hundred dollars which the session would cost was too high a price for the people of the State to pay for correcting an amateur's mistake, or perhaps believing that the Commissioners, having proved themselves so energetic in the acquisition of information, might with advantage continue their efforts for a season, declined to interfere, and the further consideration of the subject is thus necessarily deferred until the next regular meeting of the Legislature, in 1885. Meanwhile, the drawings submitted in competition have been returned to their unfortunate authors, the total result of whose efforts has thus been to advertise themselves as persons of character or attainments so inferior to those of other architects as to induce them to accept terms which all respectable members of the profession rejected at once.

A CORPORATION has just been formed in New York, under the name of the National Sewerage and Sewage Utilization Company, about whose plans and purposes we should like to know more. The capital stock of the company is fixed at three million dollars, so that, unless it should prove to be another of the countless schemes for defrauding innocent people under cover of a few scientific catchwords, the enterprise seems to be intended for operations on a large scale. There can be no question, it seems to us, that ample pecuniary success awaits the person or persons who shall, we cannot say how long hence, undertake, with thorough knowledge and economical administration, the application of animal refuse to the enrichment of land, on a large scale. Hitherto, as every one knows, the experiments in sewage utilization made in England and France have met, as a rule, with only partial success, but their result has at least been such as to encourage the belief that further experience will surely show how to lessen the cost and increase the profits of the business. In order to secure this most desirable end as quickly as possible, it is worth considering whether experiments on a small scale could not with much advantage be carried on by individual proprietors, if the way could be pointed out, and a little public spirit aroused. We acknowledge that, for ourselves, we never see the line of rich, strong vegetation which marks the overflow of a neglected cesspool without thinking of the wealth of blossom and harvest into which the contents of the pit might be converted, if the whole could be used in the same way as the few drops which run over the top. The world hardly yet realizes the significance of that marvellous cycle by which the foul refuse rejected in the necessary purification of the animal economy is transformed again by vegetation into clean and delicious food; but it may at least be remarked that the interruption of this natural course is followed by the heaviest of penalties; the land deprived of nourishment, becoming gradually barren, at the same time that the air, poisoned by the emanations of fertilizers out of place, loses its wholesomeness, and becomes dangerous to breathe.

THE German architects are engaged in a discussion in regard to a revision of their present schedule of charges, which has been in use for fourteen years, and is now found inadequate to its purpose. The Austrian members of the profession have been the first to propose a change, and the modifications suggested by a committee chosen from among them are published in the *Bauzeitung*. As we have never seen a copy of the original schedule, we are unable to compare it with the revision, but its main provisions, which are, we believe, about the same as those in use in all other civilized countries, seem to be unchanged, the variations applying mostly to minor matters, about which the English and American schedules say nothing. For example, the first of the new rules advises that all disputes between architects and their clients should be, by a previous agreement, left to the Court of Arbitration of the Austrian Engineers' and Architects' Association for determination. This suggestion, we imagine, would not commend itself to English-speaking clients, who can generally count upon a curious prejudice against architects on the part of judges and lawyers, and a dense ignorance of the whole subject on the part of juries, to warp justice in their favor; but it has, for all that, a good deal of merit. The provisions which follow prescribe minute directions upon points which are among us left to chance, usually to the detriment of the architect, but sometimes to that of his employer. The eleventh article, for instance, prescribes the fees for office consultations, the price of a question and "simple reply" being two dollars, and the remuneration increasing with the difficulty of the subject on which advice is sought. For business on which the architect has to work after seven o'clock in the evening his fees are doubled; and in measuring or other outside work where the architect is accompanied by an assistant, the services of the latter are charged for at half the price of those of the architect himself. In estimating travelling expenses the architect is to be entitled, when he has to take a carriage, to use one with two horses; and charges also for first-class fare on railway trains and steamboats; but an assistant is expected to travel on land in a one-horse carriage, or a second-class compartment on the railways, although he is entitled to first-class accommodations on steamboats.

A NEW occupation for ladies has been found in England. It seems that the Crystal Palace Company maintains a school for teaching the art of improving estates, and among other branches gives instruction in landscape gardening. One of the students in this department during the past year was a lady, a Miss Wilkinson, who received immediately an appointment to a position as professional adviser in a charitable society which supervises the laying out of church-yards and ornamental grounds of various kinds. It seems not unlikely that this pursuit may be found attractive to many other ladies besides Miss Wilkinson. There is no doubt of the need for educated landscape gardeners in many parts of the world, and nowhere is the want more felt than in this country; and if women should succeed half as well in such work on a large scale as they do with their modest flower beds and borders, they would soon find their services in demand.

THE Duke of Marlborough, in imitation of his Grace of Hamilton, has been endeavoring to raise a little money by selling off his superfluous bric-à-brac. The first articles disposed of were some copper dishes, painted in enamel at Limoges some two hundred years ago. Of these, one, an oval plate, painted with scenes from the Apocalypse by Jean Courtois, was bought by the Duke of Westminster for fifty-three hundred dollars; and the same noble purchaser secured also, for some-

thing over forty-five hundred dollars, a little pitcher, "painted in brilliant colors," by Susanne de Court. Another oval plate was sold to a different collector for the same price, but the rest of the pieces found a comparatively poor market. The furniture, which was to have been sold after the enamels, met with even less success, and finding that no bid above thirty thousand dollars could be obtained for a table inlaid with china plaques, his Grace stopped the sale in disgust. This particular table is said to have belonged to Marie Antoinette, but the unfortunate queen seems to have owned such an enormous quantity of furniture and Sèvres porcelain that her name alone does not add much to the value of any particular piece, and the table itself does not appear to have had the intrinsic merit of the lovely Riesener furniture which was sold with the Hamilton collection.

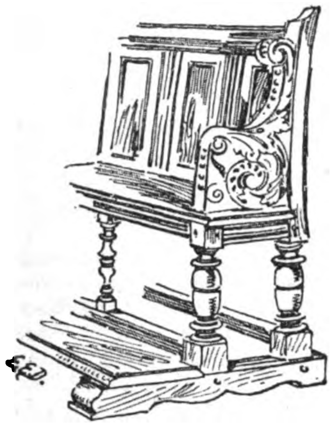
IN that home of eccentricity, Bedford Park, a house has recently been built which at least deserves mention as a curiosity. It is intended for the residence of a physician, and presents the peculiarity of having no fireplaces, as well as no doors inside the house, and nothing but fixed sashes for light, the kitchen window being the only one made to open. In order to preserve the inmates of the house from suffocation, fresh air is supplied to them from a reservoir in the basement, opening through an area to the exterior atmosphere. A stove placed in the basement reservoir is intended to warm the air in winter, and it is thought that ice can be used to cool it in summer. The basement chamber communicates by means of gratings in the floor with the corridor and staircase hall above, and each room is provided with an exhaust flue, by means of which air is to be drawn in through the door opening, and finally carried into a foul-air shaft, and discharged through the roof. The motive power by which all this circulation is to be maintained is derived from the smoke-pipe of the kitchen range, which is of iron, and passes through the main exhaust shaft. The whole affair seems to be a rather crude attempt to apply to a small house the kind of ventilation which used to be employed in hospitals until experience showed its inefficiency. If any one wishes to understand the condition of a building so constructed after some years of use, he can find an approximation to it in the lower regions of a passenger steamship, which are ventilated in something the same way. We are inclined to think that a single visit would convince him that however preferable a slow artificial ventilation may be to no ventilation at all, the free range of the wind through windows opened two or three times a day has a virtue in refreshing and purifying inhabited rooms which no machine currents have yet been able to emulate.

DEFINITE arrangements have been made for the construction in Vienna of an extensive system of elevated railways on the model of those in New York, to be completed within two years. The estimated expense of the system proposed is twenty-five millions of dollars, and as that sum will pay for a great deal more iron-work and engineering in Austria than in New York it would seem that a very comprehensive undertaking must be in contemplation. The road, or rather net-work of roads, is to have a double track everywhere except over the bridges, where four tracks are thought necessary to accommodate the expected traffic. The road-bed is to be twenty-six feet wide, supported on iron posts set from sixty to seventy feet apart. The whole line is to be raised above the surface, except in a single section, where it is thought best to traverse a hill by a cutting, instead of ascending it. In the city of Paris, where the question of rapid transit has been discussed about as long as in Vienna, a solution has not yet been reached, but the council has already declared the matter to be "urgent," and suggestions for securing the desired end are invited from all persons interested who may be qualified to give useful advice. The inequality of the surface of the ground in and about Paris does much to complicate the problem, as several of the routes included in the general system of communication which has been determined upon would be impracticable for an elevated railway like that in New York, while the general feeling of the Parisians is so strongly averse to underground roads as to make it important to avoid subterraneous lines as far as possible. The result will probably be the adoption of a mixed system of lines above and below the surface; but one can hardly help observing that if the proprietors of the Meigs patents really felt the confidence which they profess in the value of their single-rail elevated railway, they would do well to transfer their activity from Massachusetts to Paris, where they will find, instead of a population somewhat snappishly contented with its present means of locomotion, a people and a government prepared to welcome with enthusiasm anything so admirably adapted to meet all their wants as the Meigs road would be if the expectations of its inventor were reasonably justified.

THE first French grain elevator has just been completed and put in operation at Bordeaux, to the great admiration of all persons interested in transportation, and among others, of a correspondent of *Le Génie Civil*, who writes to that journal a full account of it. According to this correspondent, the success which American grain has met with in competing with the foreign product in European markets is due in great part to the superior skill and economy with which it is handled. While a French vessel loaded with wheat would be discharged by men, slowly carrying the grain in bags on their backs to the pier, to be there, unless carried immediately away in wagons, deposited in a heap on the bare planks, and covered, at most, with an old canvas, until wanted, an American canal-boat or train is simply moved up alongside an elevator and there filled or discharged in a few hours by machinery, the grain remaining clean, dry and cool throughout the process. If there is no immediate call for it, the wheat or corn remains safely stored in the elevator bins until called for, and if any of it should have been badly harvested, or damaged on the voyage, the same machinery which originally handled it will dry it, winnow it, weigh it both before and after the process, and repack it in good condition. All this, according to the French engineer's estimate, costs the American dealer about half what his foreign rival has to pay for work much worse done, and occupying a great deal more time, and the saving so effected is sufficient to pay the cost of nearly five thousand miles transportation and to enable the Minnesota or Manitoba farmer to undersell the French in their own markets. It is not surprising, therefore, that an effort should have been made abroad to meet American competition by imitating American methods, and the Bordeaux elevator is only one of a series to be built under the care of a company formed expressly for the purpose.

WE mentioned some time ago that an improved process had been invented for the extraction of sulphur from the earthy masses with which it is found associated. This process has recently been improved, and is now in operation on a large scale in several mines in Sicily, where it is found to be not only much more wholesome than the old process of burning the ore in close heaps, but much more profitable also, the new method producing nearly twice as much sulphur from a given amount of ore, as well as utilizing the fine dust of the mines, which has hitherto been wasted. The sulphurous acid evolved from the burning kilns of the old process is so injurious to vegetation, as well as to human life, that the work is prohibited throughout Italy from July to January in each year, and many attempts have been made to dissolve out the sulphur by some kind of "wet process," which could be carried on without annoyance throughout the year, but the cost of the superheated steam, or the bisulphide of carbon, hitherto used for the purpose was too great to give commercial success to the improved methods. By the substitution for the more expensive reagents of a solution of chloride of calcium, which is formed as a waste product in the manufacture of soda, and costs in Italy only about one cent a pound, this difficulty is now removed, and the extraction of sulphur by the wet process is a simpler and cheaper method than that by roasting the ore. The apparatus employed is by no means complicated, consisting only of a furnace, kept constantly heated, with two iron tanks so arranged as to be alternately subjected to the action of the fire. The boiling point of a saturated solution of chloride of calcium is above two hundred and fifty degrees Fahrenheit, while the melting point of sulphur is about two hundred and thirty-two degrees, so that by filling the tanks with chloride solution and ore, and raising it nearly to the boiling point, all the sulphur melts out and collects at the bottom of the tank, from which it is drawn off into moulds and cooled. To make the operation continuous, one tank only is charged at a time, and as soon as the ore in it is exhausted the calcium solution is pumped into the other, to operate on a fresh charge, while the one first used is cleared of the earthy residue for renewed use.

FROM BAYREUTH TO RATISBON. — NOTES OF A HASTY TRIP. — XI.



Hotel de Ville
Benches. Damme. Belgium.

WHEN one enters these ugly Munich buildings of which I have tried to give some faint idea, how different a scene presents itself! How great are the treasures gathered together within them! When Ludwig was still Crown Prince, in the early years of the century, his agents were fortunate enough to secure the Eginetan sculptures together with many other valuable relics of antiquity. To accommodate these the Glyptothek was built, and it gives them capital housing, if one can overlook the gaudy colors with which the vast coffered ceilings are adorned and the tiresome frescoes with which portions of the upper wall are covered. Then in the old Pinakothek is the splendid collection of pictures — in certain points unrivalled among the galleries of Europe. One does not care much for a whole room full of small Van Der Werffs, but the case is different when one comes to a great saloon entirely filled with Rubens's works or to the many rooms in which the old German pictures hang — most of them originally belonging to the famous Boisserée collection. Here one sees Dürer and the elder Holbein and Burkmair, and many another as they are nowhere else to be seen, and farther back in time the Cologne masters, chief among them the great early artist called the "Master of the Lyneburger Passion." And this is the only gallery in the world where one can readily learn to know Adriaen Brauwer, one of the most masterly technicians who ever lived and one who has had a most vital influence on the younger Munich school. Here hang a dozen or more of his splendid little canvases (which show as do none beside how good art can redeem the most commonplace and even vulgar subject-matter), while the galleries of his native land count themselves fortunate if they hold a single specimen. In engravings and drawings the collection is also very rich. And when all these have been studied there remains the vast collection of antiquities at the National Museum, even vaster than the similar one at Nuremberg, though housed in less fascinating fashion. For order, for chronological exactitude, for instructive cataloguing, no museums in the world surpass these, presided over by men endowed with the characteristic painstaking qualities of German scholarship.

The government glass factory we visited in the hope of finding something interesting; we found, indeed, that there had been much improvement since the days of the first revival of the art, the days when, for example, the blindingly crude and hideous new windows at Cologne were made; but nothing more than inoffensive mediocrity of color had been attained, and in design there was little originality. The best pieces were copied from drawings by Holbein or from other time-honored sources. A big window just completed for a Frankfurt church, fortunately showed us the most ambitious work that is undertaken. To compare it in the remotest way with the work done here by Mr. La Farge, for example, was an impossibility; not only were the new aims, the new methods and the new effects which he has compassed quite unthought of, or any others of the slightest novelty desired, but even in what I may call the old modern track there was not the slightest approach to the power over color he displays. If inoffensive and sometimes almost pleasing the color was always cold, formal, inartistic; nor need we take Mr. La Farge as a standard, for there are many other producers of glass in this country with whom the German fabricants are not to be compared either for originality of aim or for success of outcome.

I have said that the government interest in art has declined of late years since the accession of the present king, whose love is all for music and not at all for painting — that, for example, pictures are no longer bought to fill the walls of the New Pinakothek. But the great artistic educational establishment is upheld with undiminished liberality, as I need hardly say to my American readers. Who has not heard of the school at Munich as one of the most seductive goals toward which the Yankee student yearns? The men who are now the chief Munich painters or professors have a world-wide reputation — Piloty, Dietz, Lenbach, Leibl, — it is strange indeed to think that such artists should have grown up here as the successors and under the tuition of such men as I named in a former chapter. No antithesis could be greater — on the one hand the most earnest effort, the most minute and scrupulous care, but the most utter want of artistic endowment either in feeling, in color, or in tone; on the other hand artistic individualities of a force and charm unsurpassed to-day in Europe and of such a freedom in execution as has made the "Munich manner" a by-word of reproach to those among our picture critics who cling to the old traditional hard, labored, shiny, varnishy practice of Düsseldorf and of Munich as she was a generation back. The very sons of some of the most tiresomely Philistine of these old painters are to-day leaders of the newer school, the opposites in every way of the men whose blood and whose art went to make their own. The younger Kaulbach, the younger Zimmermann have indeed little affinity with their fathers — in their case as in others we feel it has been the Old and not the New Pinakothek which has taught them their craft. It is Brauwer, and Rembrandt, and Rubens, not Cornelius, and Overbeck, and Kaulbach who have been their teachers.

Most of the artists are out of town in the summer, so it was only at the dealers' that we could get a knowledge of what they had been doing. The showing was most interesting and convinced one that while many other things might best be learned in Paris, an eye for color and tone could be cultivated to the greatest advantage in Munich. To Lenbach's studio we were taken by an American painter, Mr. Rosenthal, long resident in Munich; but, alas! the great master had left town the day before — a double disappointment, since we not only missed seeing him but also a great gallery full of portraits he has painted of many of the chief men of his generation. Of the Americans only two or three were at work, though some sixty had been in Munich during the winter. Among these was Mr. David Neal, working on a picture of Cromwell listening unperceived to Milton as he plays the organ; and Mr. Crone, a young man who has sent several studies to this country but nothing which shows his full promise, especially nothing which shows his real coloristic talent. In his studio was a copy of a Van Dyck at the Pinakothek — the "Descent from the Cross" with half-life-size figures. In color and tone it is the most lovely Van Dyck I have ever seen and the copy was a truly marvellous bit of work — as freely handled, as exquisitely colored as the original itself. I cite it as an interesting and promising *tour de force*, for Mr. Crone told us he had done it from memory only — going to the gallery to look at the picture, coming home to paint what he could remember, and then back again for a fresh impression. Mr. Rosenthal, who is the oldest resident among the Americans, having been in Munich some sixteen years already, is well-known in America through reproductions of his works, though not usually recognized, I think, as a countryman of our own. Elaine floating down the river "steered by the dumb;" the young monk who watches the butterflies in the sunbeam as he sets the convent table; the flock of boarding-school girls hunting ghosts in the garret and finding cats — these are all among the most familiar photographs in every shop. But thanks to his long exile and his German name their author is rarely known to be a native of San Francisco and still a true American at heart. With his long foreign residence, his German wife and a European *clientèle* which keeps him more than busy, he feels no impulse to come home himself; but his advice to his younger fellow workers is not to do as he has done and as he was much more justified in doing fifteen years ago, but to come home as soon as their course is finished, to go to work upon home material, with home sympathies, and home inspiration. At the time of our visit Mr. Rosenthal was working on a large picture — a scene from "Marmion" showing Constance in her boy's dress before her judges. A recent work which technically seems to me the best thing he has done—quite admirable in handling, in color, and in its strong yet not overcharged expression of character — showed a motherless peasant family gathered sadly for their evening meal. It was one of the very best *genre* pictures at the Paris *Salon* of 1882 and was exhibited during the past winter at Schaus's in New York.

One thing that no visitor to Munich should neglect to see is the picture collection of Graf Schack, which may be freely visited, I think, upon any day in the week. Its contents are of various sorts, some of which will be quite novel to the American student. The Swiss painter Böcklin, for example, is quite unknown to us, but is an artistic personality of the utmost originality and interest. His work is always of the most imaginative sort — and though his imagination sometimes runs into extravagance or *bizarrerie*, is sometimes morbid and unhealthy, and sometimes leads him to attempt subjects better suited for literary than for pictorial exposition, yet it often inspires him to work which is thoroughly artistic and wonderfully fascinating. I remember particularly among his many canvases in this collection a life-size group of a mermaid, a merman and an infant lying on a rock in the sea and playing on curiously wrought shell-like instruments of music. In color and handling the work was admirable, but still more remarkable for the imaginative strength displayed in the conception of the figures. They were not the stereotyped human beings with fishy caudal appendages that have so often been painted, but real marine creatures, outlandish, scaly, seaweed covered, yet not unbeautiful. And they were alive with a vivid realism which half-convinced the spectator of the existence of their actual prototypes. Still more attractive was a smaller picture illustrating an idyl of Theocritus, with a shepherd lad piping to the nymph dimly seen in her watery veil within the grotto by the door of which he stands. Over this entrance hangs a heavy garland of pink roses of a bright hue that only a master hand could have harmonized with the delicate tones of the rest of the picture, but which, being thus harmonized, added an enchanting note to the composition; yet the chief interest lay in the figure of the boy — in his beautiful, passionate, dreamy face and the gesture of half-intoxicated longing with which he sang. It is impossible to describe such art in words, for its charm lies in its strong and peculiar feeling, in its revelation of a distinct and very original artistic personality — rarest of things in these prosaic days of art.

A large portion of the gallery is filled with copies from the old Venetian masters — the best I have ever seen exhibited, the only ones which can really give an idea of the great originals to those

who have never seen them. Most of them were executed by artists whom Graf Schack sent to Italy for the purpose. A large number are due to the hand of him whom I have already named as perhaps the greatest of living portrait painters—Lenbach. Discovering his genius at an early age, Graf Schack sent him to study the masters of his art, thus not only securing for himself these unrivalled copies but giving excellent aid toward the development of a wonderful talent. It is undoubtedly to these long and earnest early studies which the wise generosity of his patron made possible, that Lenbach owes to-day his splendid color and his perfect tone. His own portrait hangs next to his beautiful copy of Titian's "Man with the Green Eyes," and together with it reveals the modern master's skill and his claim to be called a true descendant of the great Venetian portraitists. His likeness shows a dreamy, scholarly, most interesting face with a blonde beard and spectacles. M. G. VAN RENNSELAER.

PLUMBERS AND SANITARY ENGINEERS.

NEWPORT, R. I., July 17, 1883.

AT the recent convention of the master plumbers, at Masonic Hall, in New York City, an address was read by "Plumber Enoch Remick," of Philadelphia, which was supposed to represent the spirit and aims of the convention. Mr. Remick said:—

"A newly-invented profession is sprung upon the world, called sanitary engineering, which proposes to its confiding patrons to guard and protect them against their insidious enemy, the plumber. Boards of Health, too, lend their aid to these magniloquent braggarts, by publicly setting the seal of their disapproval on practical skill and experience, and their unqualified endorsement of book-taught experts and newspaper scientists. It is a fact to-day that the men whose lives are spent in the solution of, and whose pursuits lie closer to, the sanitary problems of the day than any other, are ostentatiously ignored, and the claims of raw graduates from medical or other schools are as brazenly thrust in the face of the public."

This view of the case is hardly to be regarded as a strictly judicial one, and it would be easy for sanitary engineers to retort in corresponding language with reference to the character and qualifications of a great number of very ordinary mechanics, who, as master-plumbers, do a great deal of demonstrably bad work, and of a still greater number of journeymen who do bad work for which they have no responsibility. Attention might be called, too, to the eagerness with which master-plumbers of a certain class append to their trade-title the now popular one of "sanitary engineer."

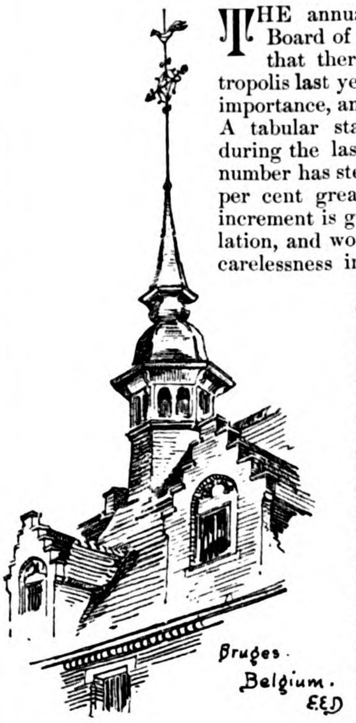
It is probably not true that Boards of Health lend their aid to "magniloquent braggarts," nor that they set the seal of their disapproval on "practical skill and experience." So far as I have been able to judge — and my observation has been considerable — Boards of Health are very careful, in establishing regulations and in providing for the inspection of work, to secure the advice and co-operation of really skilful and experienced plumbers. I fancy, too, that they are little influenced by the opinions and advice of engineers to whom Mr. Remick's opprobious epithets could with propriety be applied. "Raw graduates" are hardly thrust in the face of the public save in very rare cases, by their own act. Nevertheless, though Mr. Remick's tirade is hardly worthy of serious consideration, the motive underlying his remarks, in spite of his lack of skill in giving it expression, is a very sound and worthy one; — no more sound and worthy, however, than is the underlying motive of the abuse of the plumbing profession, which finds equally unfortunate expression in the comic papers.

The fact is that there are very few plumbers who are capable of going beyond the practical mechanical details to which they have been trained, and who have a just comprehension of the fundamental principles of sanitary drainage. It is also a fact that a small but obtrusive element among newspaper writers have been much too eager to seize upon defects of the work of merely practical men, and to magnify the wisdom and importance of purely theoretical men. The whole subject of sanitary drainage, when considered as the object of popular interest, is hardly ten years old. The number of professional men who have given attention to house-drainage for more than five years past may almost be counted on the fingers of one hand. Many of those now offering professional advice in the matter are, it is true, scantily equipped for the duty. The demand has created a supply; but it has been a commercial demand, creating a commercial supply from such material as existed for the purpose. Such fault as there is lies largely with that portion of the public which is impatient of the bungling work to which so much of its house-drainage has been subjected, and with young men or with older men, unsuccessful in other fields, who have sought to make money by attempting to supply a newly-felt need. The real interests of the people are not to be served by the assumption of too much influence in drainage matters by master-plumbers, any more than by the worse than useless officiousness of engineers who are not qualified for their special duty. It would have been well had the Master Plumbers' Convention been told, in better temper and in a better spirit, that whatever influence may be obtained over a small fraction of the public by sanitary engineers, nothing can prevent the practical monopoly of the business of house-drainage by master-plumbers themselves, and that no abuse of another profession can relieve their own of the responsibility which rests upon it of accepting and applying with intelligence and care the unmistakeably true lessons of modern investigations. It would have been judicious, also, to have more attention called to the fact that so long as the responsibility for house-drainage is relegated, as it now so largely is, to journeymen, with insufficient supervision, or with the supervision of men not qualified for the duty, so long must it remain the most imperative obligation of the master-plumber to qualify him to meet his serious responsibilities.

It is, and it will always remain, "my plumber" whose advice to the householder, and whose guaranty of satisfactory sanitary conditions will prevail. Not in one case in one hundred will he be overruled by anything that a "sanitary engineer" may say. He should not be slow to heed such saying when it is sound.

GEO. E. WARING, JR.

THE PREVENTION OF FIRES.



THE annual report just presented to the Board of Works by Captain Shaw shows that there were 1926 fires within the metropolis last year: of these 1762 were of slight importance, and 164 ended in serious damage. A tabular statement of the fires in London during the last seventeen years shows that the number has steadily increased, and is now forty per cent greater than it was in 1866. This increment is greater than the increase of population, and would appear to point to growing carelessness in the use of fire. A scrutiny of the classified list of the origins of the fires does not show any preponderating cause that should be more dangerous now than a few years ago. By far the larger number of fires come from domestic causes. We find that last year 29 fires arose from airing linen, 106 from candles, 76 from children playing with fire and matches, 189 from defects in flues, 166 from gas in one way or another, 154 from the use of lamps, and 126 from sparks thrown out of the fire. But while the frequency of fires increases, the proportion of serious fires steadily diminishes. In 1866 one fire in every four was classed as serious, but since that date our power to keep a conflagration within moderate limits has been so greatly enlarged that now only one fire in eleven attains importance. This is probably due mainly to the introduction of steam fire-engines and a better water-service, although the latter is still far from perfect. While in some provincial towns, and notably in Manchester, there are plugs every hundred yards in the streets, from any of which a jet can be thrown over a four-story building at any hour of the day or night, without any appliance beyond a hydrant and a hose-pipe, we find that in London on forty occasions during the last year the operations of the Fire-Brigade were crippled by the water companies; ten times there was a short supply of water, twenty times a late attendance of the turn-cocks, and ten times no attendance at all. The lowness of the water-pressure has no doubt greatly contributed to the increase in the number of steam fire-engines, of which there are three large ones and thirty-eight small ones, as against one hundred and fifteen manual engines. But although the number of the serious fires has been small it is only necessary to recall a few of the leading ones to see that the total loss of property has been immense. A fire in the neighborhood of Cheapside has come to be recognized as one in which the damage is to be reckoned by hundreds of thousands of pounds, if not by millions. In a vicinity in which huge blocks of buildings are crammed from attic to basement with combustible material of every imaginable kind, and are separated from each other only by lanes in which it is a difficulty for two vehicles to pass, it is easy to understand that the Fire-Brigade finds itself almost powerless, and has to be content with confining the flames to the block which they already have seized, until they have consumed everything within it. Few of the city warehouses are fireproof, and the great majority are not even professedly so. They are filled with wood; wooden floors, wooden staircases, wooden shelves, drawers, counters, stands, and boxes occupy all the space not required for locomotion, and when a fire breaks out, this wood forms a path for the flames and gives forth a heat that effects the destruction of less combustible materials such as woollens, linens, and the like. And what is true of warehouses is still more true of the hundreds of light trades that are carried on in the metropolis. They are all located in

rooms in which a fire needs only a few minutes' start in order to consume the contents, even if the shell of the building escape. It is not usually the actual object of trade or manufactures that offer the greatest danger; often they are of but slightly combustible nature, and are generally so tightly packed that an ordinary fire cannot penetrate beyond the edges, but it is the permanent fittings of the rooms that constitute the danger. These present an ample surface to the air, and generally run all round in a way that favors the rapid extension of the flames. Every one knows the difficulty of lighting an ordinary domestic fire without wood; neither paper nor shavings are sufficient for the purpose alone, and although both blaze up brightly, neither of them inflames the coal. But from wood there is a clear flame of great heat and penetrative effect, which is the cause of the very rapid passage of the fire from the spot on which it starts to staircases and well-holes that afford communication from room to room. If the wooden fittings of a building could be entirely replaced by iron many a calamitous fire would have burnt itself out without extending many feet, and ample time would be afforded for the Fire-Brigade to arrive before the conflagration assumed unmanageable proportions. But in the great majority of cases iron fittings are an impossibility, and there is no alternative to the use of wood.

Many attempts have been made to render wood uninflammable. So long ago as July, 1871, we called attention to an experiment made at the works of Mr. Frederic Ransome, in which a wooden shed partly painted with silicious paint was set on fire; the unpainted portion was completely destroyed, while that which was protected by the silicious covering escaped ignition, and although deeply charred never took fire. The composition of the paint was analogous to that of Ransome's patent stone; it consisted principally of a mixture of pure silex and soluble silica, which was afterwards converted into an insoluble silicious covering by an outer coating of chloride of calcium. Although this invention promised well at the time it never came into extended use. But the idea of covering wood with a fire-resisting surface having been published, it was taken up and improved upon by others. The refractory quality of asbestos has been known since the time of the Romans, who used cloths woven from its fibres upon their funeral pyres, and we find that Mr. Thaddeus Hyatt, who had already spent much pains upon developing the industrial uses of asbestos endeavored to turn it to account in the protection of buildings against fire in the form of a coating of cement. He ground the shorter and less valuable fibres into a slip or paste, analogous to porcelain slip, and combined it with gelatinous silica, either alone or in conjunction with magnesia, baryta, alumina, or lime. Whether he ever put this part of his invention to any practical use or not we do not know, but we never heard that he did; indeed it is scarcely possible that he should have practically worked out all the uses to which he proposed to apply asbestos.

In 1881, Mr. E. G. Erichsen, of Copenhagen, who had been connected with the earlier experiments at the works of Mr. Ransome, brought out a new protective composition in which there is likewise a large per centage of asbestos. When intended for use as a paint or enamel it is composed of a silicious solution, pulverized asbestos, metallic oxides and chalk, the asbestos forming ten to twenty per cent of the whole. Applied as a paint, it forms a fire-proof enamel, capable of resisting a white heat. It is worked upon brickwork and woodwork with an iron trowel or wood plate covered with felt; it can be laid on in a thicker or thinner coat as may be desired, and can be cleaned from time to time with hot water. Mr. Frederic Ransome has acquired the patent for this country, and the paint is now coming rapidly before the public; on the Continent it is already largely in use.

The latest fire-proof paint is the invention of Mr. C. J. Mountford, of Birmingham, whose patents have been acquired by the United Asbestos Company, of 161, Queen Victoria Street, E. C. This is simpler in its composition than the last, and consists of asbestos ground and reground in water, aluminate of potash or soda, and silicate of potash or soda. When it is to be exposed to the weather it is combined with oil, dryers and gummy matters, and in some cases with zinc oxide or barytes. As will be seen from another part of the paper the whole of the buildings of the Fisheries Exhibition in the Horticultural Gardens, are to be painted with this material. In itself this is worth a volume of testimonials. On two sides of the ground are valuable collections of works of art and scientific objects, while on the third side is the Albert Hall. Over the way, too, is the South Kensington Museum, containing the vastest assemblage of objects of decorative art ever amassed, and it requires little acquaintance with Government officials to know that their consent could never have been obtained to the erection of light timber buildings covering 230,000 square feet, if they had not been convinced that there was a method by which they could be rendered fire-proof. On Friday last a public trial was made in the gardens before fifty gentlemen to demonstrate the security of the buildings. Two wooden huts, one of plain timber and one painted with three coats of asbestos paint, were filled with shavings and simultaneously ignited. The first caught fire at once, driving the spectators backwards by its heat and the extent of its flame, while in the second the shavings, after a hearty blaze that scorched and blistered the paint, fell into a heap of red embers. Half a bucketful of petroleum flung into the hut filled the inside with a fierce flame that belched forth in a solid body and curved on to the roof, and for a few minutes it was the opinion of the on-lookers that the confidence of the inventor had overleapt itself. But gradually the petroleum vapor became exhausted and little flame remained beyond that of the gas driven out of the cracks of the wood by the intense heat. The structure was intact and it needed no special skill to see that a slight building filled with combustible material, would, if painted with asbestos paint, be able to retain the fire within itself for sufficient time to allow of the arrival of the firemen. But the reputation of the paint does not rest upon an isolated experiment; not only in London, but also in Birmingham, Manchester, and Liverpool has it been severely tested, and every time successfully. Asbestos has now established its character as a fire-resisting material, and we think that a grave responsibility will attach to all that have the management of buildings in which special risks are run, such as theatres, music-halls, carpenters' and packing-case makers' shops and the like, if they fail to avail themselves of it in some form or other.

But although it may be possible to localize a fire for a time, our experience of the way in which the flame will destroy a building almost entirely of iron and stone forbids the anticipation that the use of fire-proof materials will be of sufficient avail by themselves. Once a structure is fairly alight stones and cement crack and fly, and iron girders twist, and it is not paint alone that will preserve them. The respite that it gives must be turned to good use in extinguishing the flames. Unfortunately, this interval is often lost for want of apparatus, particularly in the country, where it is a long way to the fire-engine station. To supply the necessary means for quickly quenching a fire Mr. Foster, of Bolton, has brought out a portable fire-engine which emits a stream of carbonic acid and water. By this arrangement he is able to keep its apparatus within small limits, as the pressure of the carbonic acid is available for propelling the jet, and, as is well known, it is extremely efficacious in stopping combustion. The same idea has long been before the public in the form of the Extincteur, which is universally known and appreciated. Mr. Foster's engine differs from this in being a pump that can be kept going during the whole progress of the fire, and can be supplied with fresh chemicals from time to time as they become exhausted. In addition to his pumps he has a portable chemicalizing chamber through which water from a high-pressure main can be passed and be impregnated with carbonic acid. On Wednesday last a public trial of Mr. Foster's apparatus was made on a piece of waste land near the City of London Schools. A wooden house had been built, the upper story of which represented a bedroom. This was saturated with tar and petroleum, and when filled with flame was extinguished by a jet from a one-eighth inch nozzle in one minute. The lower story represented a warehouse filled with boxes saturated with petroleum, and when fairly alight was extinguished in little more than a minute. Other experiments followed all of which were successful in demonstrating that a small quantity of water impregnated with carbonic acid will put out a fierce fire, especially in confined situations and in cases where the combustion has not penetrated below the surface of the burning surface. — *Engineering.*

THE ILLUSTRATIONS.

HANLEY TABERNACLE CHURCH BUILDINGS.

[From the *Builder.*]

THESE buildings have been erected from the designs, and under the superintendence of Messrs. William Sugden & Son, architects, of Leek, whose plans were selected unanimously by the committee in a limited competition.

The High Street façade has as its central feature a tower of considerable size, with octagonal domed stair-turret, and with the belfry stage enriched by traceried openings of the noble proportions which we owe to the English builders of the fifteenth century. From the battlemented parapet of the tower rises a peaked tiled roof, with dormer gablets, to a height of about 150 feet from the street. A stone spire was avoided owing to the nature of the ground, the neighborhood being largely mined. To the right of the tower we have the gable of the lecture-hall, adorned by a traceried window of seven lights flanked by traceried buttresses. To the right of the lecture-hall gable is its entrance-porch, forming also the girls' entrance to the school; and to the left, at the foot of the tower is a spacious carved porch, the main entrance to the chapel. The front gable-end of the chapel, which lies just to the left of the tower, takes an octagonal apsidal form, and has a battlemented parapet in front of a gable panelled by tracery. This octagon has decorated angle buttresses, and a traceried window inserted in each face, that to the centre bay being about 30 feet in height, and 12 feet in width. The front is completed by a south porch, with a doorway and window with moulded and carved tracery, terminating by a parapet, and leads under the gable of the south staircase, which is embellished by a large rose window. All the intricate stone-work of the front is executed in red Hollington stone, except some of the more exposed

parts, where the hard Roche stone (millstone grit) from the Leek district is used. The walls of this front are faced externally with specially-made local thin red bricks, and the roofs are covered with brown Broseley tiles. The tracery of the side windows, including the fine transept lights, is of red terra-cotta.

The following is a summary of the accommodation provided: — Chapel, with north and south transepts and galleries on three sides, containing 1,000 sittings, extreme length, including rostrum apse, 84 feet; width, 48 feet; width across transepts, 69 feet; height in centre, 42 feet. Lecture-hall, containing 200 sittings: length, 43 feet; width, 20 feet: height, 23 feet. Large school-room, with clerestory; library; infants' school-room; mothers' meeting-room; eight boys' class-rooms; five girls' class-rooms; one young women's class-room; and two smaller ones; young men's class-rooms, tea-room, scullery, heating-apparatus, vaults, lavatories (separate for boys and girls), ample corridors, etc. Partly on account of the nature of the ground, the architects have discarded the single span roof, which in buildings of this width militates against permanency through its excessive strain both on itself and the supporting walls, and a very openly arcaded nave and aisle arrangement has been adopted in the chapel; the piers or uprights of which, being of moulded teak wood and widely spaced, do not impede sight, while distributing equally the load of the roof. The warming-apparatus has been provided on the low-pressure hot-water system; and for ventilation, fresh air is admitted at numerous points through upright shafts, with filtering media for the arrest of fog and smoke. The foul air is drawn off by turrets on the ridges, and through the tower roof by means of special flues, whose air is rarefied by fire-clay cones heated to incandescence by gas jets. From some portion of the gas-fittings also, the products of combustion are carried off direct, the waste heat being useful in the ventilation exhaust-flues. Electric bells will probably be provided for general communication, and to call simultaneously together to the large school-room the occupants of the various class-rooms. One of the class-rooms is fitted up as a tea-room, with swing tables for service, and provided with gas-boiler, etc., and hot and cold water is laid on in taps at points to meet fire emergency and to economize labor in cleaning the premises.

The gallery front is varied by being treated as a series of balconies between the teak pillars, with open tracery and linen-fold panels. The rostrum is of similar but more elaborate design, and has under it canopied seats for the officiating deacons; its situation in a domed apse with high wainscoting has favorable acoustic results. The organ-chamber, too, being carried clear through the gallery to a lofty height, adequate space is secured both for the instrument and for the issue of the "concourse of sweet sounds."

GATE-HOUSE, ECCLESTON HALL, NEAR CHESTER, ENGLAND. MR. JOHN DOUGLAS, ARCHITECT.

[From the *Building News*.]

The gate-house and lodge is situated at Eccleston Hill, on the main drive between Chester and Eaton Hall, and forms the entrance to the home or deer park. The lower part is carried out in Manley white and Eccleston Hill red stones, all the dressings being of the former. The walling of the upper part is of small bricks, the diaper being formed out of the hard burnt or brown ended ones. The timber framing of the upper part of the lodge, as well as all the outside timber-work is of oak; and the roofs are covered with red Ruabon tiles, and have lead ridges and finials. The works have been carried out in an admirable manner, by Messrs. George Smith & Co., of London, the architect being Mr. Douglas, of Chester. The illustration is a reproduction of the drawing in the late Academy Exhibition.

INGLE-NOOK, HOLMROOK, CUMBERLAND, ENGLAND. MR. M. E. MACARTNEY, ARCHITECT.

[From the *British Architect*.]

CHIMNEY-PIECE IN THE PICTURE GALLERY, CRAGSIDE. MR. R. NORMAN SHAW, ARCHITECT.

[From the *Architect*.]

RAMBLING SKETCHES, BY MR. T. RAFFLES DAVISON, ARCHITECT. — A DAY IN THE ISLE OF WIGHT.

[From the *British Architect*.]

CHATEAU DE PIERREFONDS, FRANCE. — DETAIL OF THE ENTABLATURE.

[From *Le Moniteur des Architectes*.]

HOUSE ON BEACON ST., BOSTON. MESSRS. ALLEN & KENWAY, ARCHITECTS, BOSTON, MASS.

This house is No. 342 Beacon Street. It is 22′ x 65′. In the rear is a stable. The front is of Nova Scotia sandstone. The drawing we reproduce was made by Mr. T. Raffles Davison from a photograph.

COMPETITIVE DESIGN FOR A MECHANIC'S HOUSE SUBMITTED BY "*Cassius*."

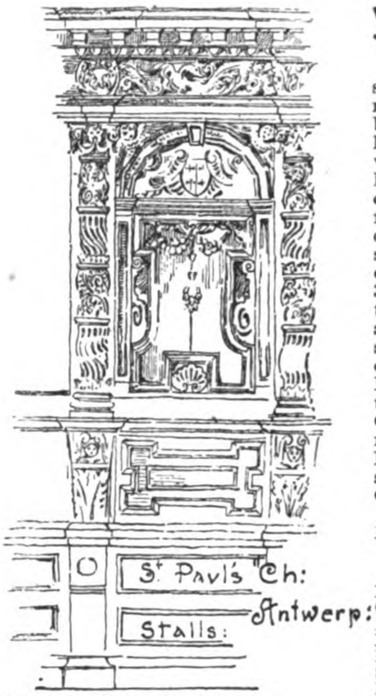
This design should have been published in our last issue, to which we refer our readers for the remarks of the jury upon it.

COMPETITIVE DESIGN FOR A MECHANIC'S HOUSE SUBMITTED BY "*Cheek*."

"'*Cheek*.' Good plan, fair exterior, hard and mechanical drawings. Better give up using the drawing-pen so much in perspective, and cultivate free-hand drawing; cross-hatching with the drawing-pen is particularly expressionless." — *Extract from Jury's Report.*

THE COMPETITION FOR A MECHANIC'S HOUSE. — IV.

SPECIFICATION FOR DESIGN SUBMITTED BY "*Cassius*."



The cellar walls to be 18″ thick, built of field stone, pointed on the inside, and from grade to sill on the outside. Trench for wall under part not excavated. Frame of spruce; boarding and under floors of hemlock. Roofs and gables covered with second quality cedar shingles, laid random widths. Clapboards on walls. Inside and outside finish of pine. Windows and doors, shop sizes. Gutters V-shaped, supported on ogee brackets. Conductors of pine, round, 3″ in diameter. Inside architraves, 5″ wide, beaded; to finish against corner blocks. Bases, simple moulded, 5″ high. Front door glazed with tinted glass. Plaster, two-coat work. Shingles to receive one coat of creosote. Clapboards and outside finish to receive three coats best paint. Inside finish, one coat of stain, selected colors, and one coat of Crockett's Preservative.

Estimate of Quantities and Prices furnished by Miller & Ladd, Builders, Boston.

Excavation, 112 yds., @ 20 c.	$22.40
Cellar wall, 50 perch, @ $2.50	125.00
Bricks, 3,000, @ $2	60.00
Fireplace	20.00
Mantel	10.00
Stairs	60.00
Painting	125.00
Windows, 9 large, @ $5.50	49.50
" 8 small, @ $4.00	32.00
Doors, 21, @ $6.00	126.00
Shingles, 16 M., @ $3.50	56.00
Clapboards, 800, @ 3.00	24.00
Plastering	90.00
Frame, 5½ M., @ 16.00	88.00
Boards, 5 M., @ $13.00	65.00
Plumbing	35.00
Base (inside finish)	25.00
Fitting closets	65.00
Nails and hardware	75.00
Top floors, 2 M. @ $25.00	50.00
Labor	300.00
Total	$1,502.90
Architect's commission	75.00

SPECIFICATION FOR DESIGN SUBMITTED BY "*Cheek*."

The cellar to be excavated to a depth of 5′ below general level. Cellar walls are of stone, 18″ thick. Frame to be of spruce. Rough boarding of hemlock. No hard-wood finish. All finish very plain. Above first-story windows shingles everywhere. Sills, 4″ x 6″; plates, 4″ x 4″; wall studs, 2″ x 4″, 16″ on centres; corner posts, 4″ x 6″; studs on doors and windows to be 3″ x 4″; floor beams, 4″ x 6″; partition caps, 2″ x 4″; floor timbers, 2″ x 6″, 16″ on centres; rafters, 2″ x 6″, 20″ on centres; ridge board, 2″ x 8″. House to be built in Brighton, Mass., where labor and material are as cheap as anywhere.

An extra flue is put in the chimney so a furnace can be put in if desired, or it can be used for a ventilating flue. The small room or closet over the hall might be made into a bath-room, all at a small expense.

Estimate of Quantities and Prices at Brighton, obtained from one of the most reliable Builders there.

Excavation	$20.00
Dry wall, 30 perches, @ $2.00	60.00
Underpinning, 15 perches, @ $3.00	45.00
4 cellar windows, @ $2.50	10.00
Bulkhead	5.00
4,500 ft. spruce frame, @ 16.00	72.00
4,000 ft. boarding, @ 14.00	56.00
8,000 shingles, @ $4.00	32.00
Gutter and outside finish	50.00
Lead, zinc and paper	10.00
500 yds. plastering, @ 20 c.	100.00
Two flight of stairs	60.00
One chimney and 3 piers	35.00
14 windows, complete, @ $7.00	98.00
One front door, complete	20.00
One back door, complete	12.00
14 doors, @ $6.00	84.00
1,400 ft. floors, @ $28	39.00
500 ft. base, @ 4c	20.00
Closet finish	10.00
Painting	125.00
Carpenter work	400.00
Nails and closet hardware	20.00
Total	$1,383.00
Builder's profit, @ 5 %	69.15
Architect's commission, 3 %	41.49
Total	$1,493.64

The Longest Bridge in the World. — This is in China, at Sangang, over an arm of the Chinese Sea. It is five miles long; the roadway is seventy feet high and stands upon three hundred arches. The parapet is a balustrade, and each of the pillars, which are seventy-five feet apart, supports a pedestal on which is placed a lion, twenty-one feet long, made of one block of marble.

RECOLLECTIONS OF FLEMISH ARCHITECTURE.—III.[1]

Fig. 8.

MANY of the stepped gable-ends in this town of Ypres have as their principal features a window surmounted by a well carved cockle-shell in a semicircular-shaped panel, enclosed in an architectural framework in brick, composed of pilasters carried on pedestals, entablature and pediment (see Fig. 8). During our stay we attend service at the Cathedral of St. Martin, which has been modernized to a large extent, the old square tower happily escaping untouched. It is very effective, and shows to advantage from every part of the city, an octagonal turret, with hipped roof, grouping in a pleasing manner with the main structure. Before leaving, we take the opportunity of walking along the top of the old fortifications which extend round the city, and are now laid out in pretty walks and planted with shrubs and trees. At the bottom of the steep walls a wide moat still exists, with bridges at intervals, the surface of the water being almost covered with yellow and white water-lilies in full bloom.

Courtrai was the next place down on our programme, but we find it best to content ourselves with seeing fewer towns, and spending more time at those we visit, and therefore decide to deny ourselves the pleasure this time and proceed to Ghent, merely breaking our journey at Oudenaerde, to see its Hôtel de Ville. This decision we act upon, and passing Courtrai by rail, having a view of its towers and spires as we go by, alight at Oudenaerde. The town is decidedly dull and commonplace, and is not to be compared for a moment to Ypres. The before-mentioned Hôtel de Ville and the Church of Notre Dame de Pameli (now unfortunately being restored) are the only objects worthy of interest, and we are thankful that we have only allowed three hours for our visit. The town-hall, though small, is considered one of the handsomest buildings in the Netherlands. It was erected in 1530, and is built in a very florid Flamboyant style. An arcade runs along the front, supporting a balcony, above which rises an elaborate open traceried tower, somewhat like those of Brussels and Louvain, though smaller and finished with a crown-like termination (Fig. 9). In the interior, the lobby to the council-chamber is enclosed by a magnificent carved oak screen, of early Renaissance character, which is without exception the finest piece of workmanship of its kind I have seen anywhere; it is impossible to do it justice by mere description, and I will not make the attempt. We tried in vain to obtain a good photograph of it, and had finally to content ourselves with an engraving which is a mere travesty of the original.

Fig. 9.

We leave Oudenaerde without much regret, and an hour's railway journey brings us to nineteenth-century life and bustle once more, as we enter the busy city of Ghent. It takes a little time to get accustomed to the noise of the traffic in the narrow streets, as we drive to the Hôtel de Vienne in the old Marché aux Grains, after the quiet and sleepy experiences we have lately gone through. The interesting buildings here do not salute you at every footstep, as is the case in Bruges, but are interspersed amongst much modern work, and require a little hunting up; but a brisk ramble through the city reveals to us many interesting studies for our pencils. The chief amongst those of a domestic character is the Skipper's House, called the "Maison des Bateliers," on the Quai aux Herbes, bearing the date 1513. On its gable-end may still be observed the arms of Charles Fifth, and the watermen's insignia, though the carving is much defaced, and before long they will be entirely unrecognizable. Knowing that it had been illustrated before by Ernest George and others, we could not resist the temptation to attempt a drawing of it for ourselves, and transfer a record of its picturesque beauty into our sketch-books. The whole façade is overspread with elaborate detail, and carved work lavished in the utmost profusion. A flight of steps leads up to the entrance, which has a heavy oaken door, framed out of thick boards, moulded on the face like the linen-fold ornament one is accustomed to see in panels. Above the transom, in place of a fan-light, is a panel containing a finely-carved representation of a three-masted vessel of antique build, resembling a Spanish galleon.

The ground-floor windows have Tudor-shaped arches, and are separated, one from another, by well-moulded jambs or mullions, with small attached shafts. The wooden casements are modern. The fenestration of the upper portion of the house is everything one could desire in the way of composition and richness of detail. Between the first and second floor windows is a row of panels containing shields, with other heraldic accompaniments. The window openings in the upper part of the gable, instead of being glazed, are covered with wood shutters. The designer, in breaking his gable-end, has produced a most picturesque and fantastic conception, and there is an artistic *abandon* about it which is charming. The sloping sides are stepped, and a series of ogee-curved moulded weatherings ascend up to the apex, intersected by tall, octagonal pinnacles, which are tied back to the gable midway in their height by curved crocketed arms.

While busy sketching from the opposite side of the canal, we are surrounded by a crowd of youngsters, one or two of them being very uproarious, which makes our work one of considerable difficulty. A waterman who is loitering about without much to do, seeing how we are molested and interrupted, constitutes himself our protector, and by means of threats and gesticulations keeps the enemy at a distance. But not for long; one or two urchins more mischievous than the rest make a dart and try to upset my stool, at the same time saluting our retainer with insulting observations. The attempt is unsuccessful, and one of them in escaping receives a violent blow in the face from our now infuriated friend. His cries bring together a crowd of people from all directions, and one or two *gens d'armes* appear on the scene and proceed to make inquiries. I am the central object of attraction, as one of the officials applies to me for an explanation, a man living near by being introduced as interpreter. An account of the incident is given. Our names and the hotel in which we are staying is entered in a note-book, while our protector, who has worked himself up into a perfect fever of excitement, is marched off to account for his actions. We fully expected to be served with a summons to give evidence in court the following morning, but happily hear nothing more about the affair, and a day or two afterwards recognize the countenance of our former friend as he passes in the street.

Fig. 10.

Not far from the hotel, and visible from the upper-floor windows, above the roof of the Church of St. Nicholas is the belfry tower, which rises to a considerable height, a fine prospect of the city and surrounding country being obtained from its topmost gallery. The tower was repaired in 1855, and a bell-chamber and low spire, constructed of cast-iron of wretched design added, painted a yellow-drab to resemble stone. Its finial carries a fine dragon of copper, gilt, which was brought as a trophy from Constantinople by the men of Bruges in one of the early Crusades, but it was afterwards taken from them by the Gantirs, after their conquest of Bruges under Philip van Artevelde, in the fourteenth century. Before leaving the tower a surprise awaits us. Taken along a corridor by the concierge, we are suddenly introduced to a *tableau vivant*, which takes us entirely by surprise, and makes us wonder for a moment whether time has not retraced its steps three hundred years, enabling us to witness a scene of olden chivalry and feats of arms. We are in a splendid apartment whose walls are hung with antique gilded and embossed leather hangings. Tapestry is to be seen here and there, its colors faded and subdued with age, while ancient Flemish worthies gaze down from their canvases upon the tragedy taking place below. Two men, one of middle age, the other a mere stripling, appear to be engaged in deadly combat. Their rapiers glitter in the light streaming through the stained-glass windows, and clash together ominously as a violent lunge is skilfully warded off. Their movements exhibit a panther-like grace as the attack is renewed from time to time, and one or other falls back upon the defensive. Their heads are protected by visors with openings in front, covered with a net-work of wire-meshing; their upper garments discarded, and leathern-covered paddings substituted in their place. How will it all end? The affray gradually

Fig. 11.

Fig. 12.

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[1] A paper read before the Leeds Architectural Association, by W. H. Thorp. Continued from page 34.

gets more desperate, and at last the elder of the duellists, pursuing his advantage, thrusts his weapon into a mortal part of his adversary's body. The conflict is terminated. The wounded man does not fall, but, with a graceful bow to the spectators, the two participants in the struggle retire from the scene. The fact is, as no doubt you will have already surmised, we are in a fencing school and have been witnessing a trial of skill between the master and one of his promising pupils.

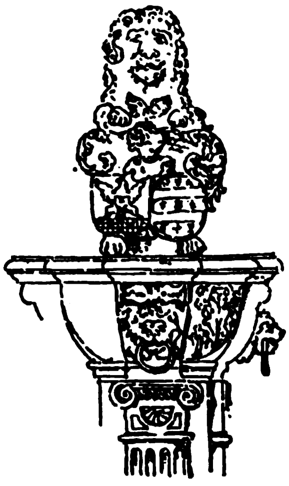
Fig. 13.

But time flies, and we must not linger much longer in Ghent. We visit the cathedral of St. Bavon, which externally is not particularly interesting from an architectural point of view, but it contains many valuable paintings, besides other antiquities. Passing the Hôtel de Ville, which has two fronts — one Italian Renaissance in style, and the other Florid Flamboyant Gothic, the latter undergoing restoration, and emerging from its time-honored garments in a brand-new dress — we come across one or two interesting domestic buildings in an adjoining street. Here we see a gable-end, as usual, fronting the street, the upper stories above the first-floor windows projecting over the footway, and carried on moulded corbels supporting low pointed arches. These corbelled-out projections constitute a feature which is often met with both in buildings of Gothic character and others of Early Renaissance style. The effect of light and shade produced is often very effective, and in the gable-end of some offices in Hunslet Lane, for Messrs. H. Conyers & Co., at present being carried out from my designs, this, with other Belgian features, is being adopted in the treatment employed.

Some old houses in the Place St. Pharaïldo, near the Fish Market, form a pleasing, picturesque group, and we sketch an old corner building with a tower at the angle in the Marché au Vendredi, once occupied by the Duke of Alva. In our wanderings in search of the Porte de Bruges, an old water-gate with its archway flanked by round towers, we pass the Grand Béquinage, one of the largest nunneries in Europe, and slightly missing our way, we come across the quarters occupied by the workpeople, an industrious and clever race, who live in really good houses, and whose countenances are for the most part agreeable and intelligent in expression. They seem to be cleanly in their habits, the children are healthy-looking and well-clothed, and there is an entire absence of appearances of squalor, poverty and neglect, which we are too much accustomed to see in our own land in similar neighborhoods. These evidences of thrift and comfort in connection with the working classes are very encouraging, and one cannot help wishing that their example should be followed to a larger extent at home.

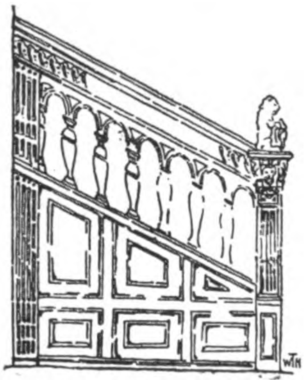
Fig. 14.

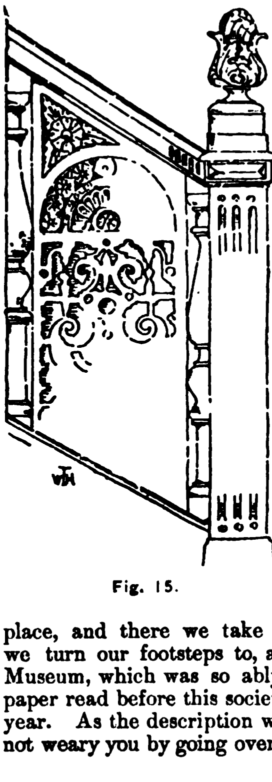
Fig. 15.

After making a hurried outline of the tower of St. Nicholas, we again pack up our belongings and journey onwards to Brussels, where a day or two are spent looking at the fine public buildings of this gay little Paris in miniature, and taking the customary excursion made by all patriotic Englishmen to the field of Waterloo. The architecture of Brussels, therefore, must be left undescribed, and we must hurry on to Antwerp, passing Mechlin *en route*, regretting that no time can be spent there to make ourselves familiar with its antiquities. The Hôtel des Flandres, in the Place Verte, near the cathedral, is in as central a position as one can desire for its proximity to the lions of the place, and there we take up our abode. One of the first places we turn our footsteps to, after a good night's rest, is the Plantin Museum, which was so ably described to you in Mr. Phéne Spiers's paper read before this society at the conclusion of the session of last year. As the description will still be fresh in your memories, I will not weary you by going over the same ground again. Let it suffice to say that our anticipations are in no way disappointed, and after obtaining the necessary permission to sketch from "Monsieur le Directeur," we fill up our time for the next four days in its delightful rooms, which are filled with objects of interest of every description. The interior court-yard or quadrangle, with the open arcade at the end, its columns and walls festooned with the luxuriant foliage of the vine, makes a charming study for a water-color sketch. The rooms are replete with quaint old hooded open fireplaces, elaborate oaken flights of stairs to get over the different levels, splendid examples of carved oak furniture, paintings by Rubens and Vandyck, stamped and gilded Cordova leather hangings, tapestries, hand-painted tiles of curious and unique design, and, in short, everything to delight the eye of the art connoisseur. The presses, types, wood-blocks, and specimens of books and engravings are still to be seen, the place being left in its original condition. Everything around us bears witness to the truth of the motto of the family, "*Labore et Constantia*" (by labor and by perseverance). Our work here leaves us little time in which to do justice to the remaining objects of architectural interest. The descriptions already given of the characteristics of the domestic architecture in Bruges and Ghent will for the most part apply equally well here. The cathedral, with its lofty, lace-like spire, containing Rubens's masterpieces, the "Raising" and the "Descent from the Cross," is too well known to require special mention. The church of St. Paul is noticeable for its "Calvary" and its remarkably fine Renaissance carved-oak confessionals. Other ecclesiastical edifices too numerous to mention are noted for the masterpieces they contain of the art of Rubens, Vandyck, Teniers, Jordaens, and others. In the Grande Place are situated the Hôtel de Ville and many fine old gabled buildings belonging to ancient trade guilds. The Hôtel de Ville is a fine specimen of Early Renaissance work designed by Corneille de Vriendt. An elaborate and picturesque composition, with pedimented gable-end, forms the central feature of the façade, the wings on either side being rather formal and academical in treatment. Some splendid frescoes representing historic events in which Antwerp has had a part, painted by the late celebrated artist, Baron Leys, decorate the walls of the great hall; the Salle des Mariages and the Salle de Justice containing elaborately-carved chimney-pieces, an overmantel of one of them framing a panel representing the "Last Supper." The "Steen," near the Fish Market, in a narrow street, once the city jail, an interesting building of the sixteenth century, is now made into a museum of antiquities. A gable-end with a nicely-designed oriel window would have made a capital sketch, but we have not time for it, our energies having been expended over the Plantin Museum and the gable-end of the Hôtel de Ville.

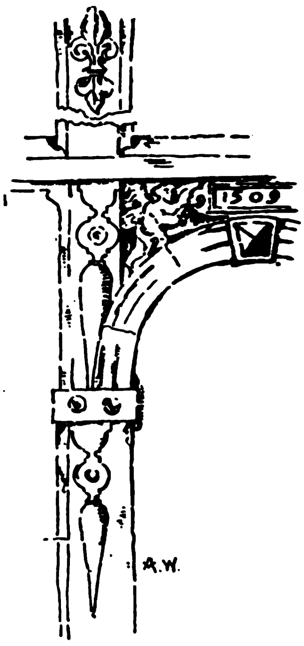

Fig. 16.

It is now time that we were homeward bound. A rapid drive along the quais brings us to the vessel, a fine steamship belonging to the Great Eastern Railway Company, bound for Harwich. Steam is up, the whistle sounds, and we are loosed from our moorings. It is a magnificent evening, the atmosphere is as clear as crystal, a refreshing and invigorating breeze blows in from the sea. As we traverse the windings of the Scheldt, the sun lights up the surrounding country, casting long shadows over the plains. The cathedral spire still rears itself up distinct on the horizon, although it is now miles and miles away. Passing Flushing, where we drop our pilot, the open sea is reached. The wind has now a chilly feel, the night draws on apace, and we turn in below. Snugly ensconced in a comfortable berth, the vibration and noise of the vessel are by degrees forgotten. A feeling of weariness and languor envelopes the wearied frame and a dreamy sensation pervades the senses. Visions of picturesque bits of ancient cities float before my eyes; quaint old gables, tourelles of charming outline, picturesque edifices, whose reflections are mirrored in the unruffled surface of the sluggish canals, charming interiors mellow with the light of bygone years, pass before me in rapid succession. A sweet low-toned melody from the carillons of some ancient belfry is in the air and acts as a lullaby. These pictures of the past are broken in upon by the bustle and confusion going on around me, and I awake to consciousness again, to find that we are nearing Harwich, and before long we plant our footsteps on English soil once more.

SUABIAN FRESCOES DISCOVERED AT AUGSBURG. — While some repairs were being made recently at the Protestant church of St. James, in Augsburg, several very beautiful large frescoes were discovered. They were hidden beneath coats of whitewash. Among the subjects of these frescoes are a figure of the Saviour, figures of St. James and St. Anthony, and the crowning of the Virgin. A stone inscription records that they were executed between 1480 and 1496. It is said that these newly discovered works are precious memorials and specimens of the early Suabian school.

THE SIPHONAGE OF TRAPS.

NEWPORT, R. I., July 17, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I have just read Mr. Hellyer's comments on my article on the above subject published in the *American Architect* of October 14, 1882.

Certainly the personal element should find no place in the discussion of an important subject like this, and I pass without comment alike the strictures and the compliments of Mr. Hellyer's paper. The "personal equation" element, however, cannot be entirely left out of consideration, and it seems almost hopeless to carry on a profitable discussion with one who has the quality at which I hinted in using the word "blandly" (not "blindly," as printed) with reference to Mr. Hellyer's deductions concerning the passage of air through Bower's trap. This same quality is peculiarly evidenced in his present paper (*American Architect*, Vol. XIII. p. 308), where he says that my experiments "would have been more valuable had he used almost any other water-closet for his testings than a pan-closet—a water-closet which every sanitarian now condemns and which is fast going out of use." Any one who has followed my writings even casually, must know that I was among the very earliest, and have always been among the most persistent of those who insisted upon the absolute condemnation of the pan-closet. But the point directly at issue and the one that seems to me to demonstrate Mr. Hellyer's limitations in scientific discussion is this: In the illustrated description of the apparatus which I used in making tests I said: "Figure 4 shows the manner in which the water-closet bowl was filled and emptied, discharging at each time about 2½ gallons of water. The pan was drawn quite back and a funnel inserted, kept filled with water, as it was found that a discharge from the bath-tub would draw all the water out of the pan, and would also unseal the 4-inch lead trap in certain experiments with a closed soil-pipe. The discharge was effected by lifting the funnel and allowing all the water to rush out of the bowl. In a number of the experiments, in order to make the test more severe, a large stable-bucket of water was poured into the bowl of the closet while discharging, as fast as the outlet would receive it without overflowing the bowl;" and in the illustration I showed the construction, both description and illustration making it perfectly clear that I used the pan-closet only as a funnel for the rapid introduction of a very large volume of water, greater than is used in any water-closet and delivered much more rapidly, — just as I might have used a Hellyer's hopper-closet or any other vessel which would afford a convenient water-way. The only purpose was to get a hopper full of water supplemented by a stable-pailful of water into the soil-pipe with the greatest velocity and volume, so as to produce the most forcible draught possible on the lateral traps. The effect was so great that when the soil-pipe was closed at the top we could draw out almost every drop of water from a trap several inches deep, and could empty the cup of Bower's trap so as to drop the ball far below the inlet. Therefore, as Mr. Hellyer bases his comments on such an absolute misapprehension of all that I have done and said, it is not worth while to continue a discussion of details with him; neither do I think it is worth while to discuss the influence of his own inventions in overcoming inherent difficulties of water-seal traps. Neither is it worth while to discuss the first paragraph, in which he implies that I have not read all of his books and lectures, and have not based my conclusions on a full consideration of all the experiments that he has made. As I remember my comments on his experiments I expressed the opinion that his conclusions were "inconsequent," basing that opinion only upon the experiments described in the paper to which I was referring. I see nothing in his present comments to influence materially the conclusions given in my October paper.

I believe that the hidden water-seal, whether ventilated or not, is an unsafe reliance;

That the great objection to the ventilating-pipe lies, not in its cost, but in its existence; the fewer pipes we have the better off we are;

That the safe and proper solution of the siphonage question is still to be found; possibly in such an enlargement of mains, soil-pipes, etc., as to prevent too great suction being produced on branches by the stream flowing through them;

That in the present state of the science a good mechanical trap is on the whole less objectionable than a vented water trap; and,

That until this difficulty is properly solved the fewer traps we have so situated as to require venting to protect their seals the better our chances will be.

The above is not a very satisfactory creed, but in my judgment it covers as much as one can to-day safely subscribe to.

Mr. Hellyer confuses, as do nearly all writers on the subject, the venting of traps with the ventilation of long lateral wastes. This latter is always necessary when long laterals are necessary; the former is, I think, only a makeshift and, at least as it is carried out in this country, not a very reliable one, — always an objectionable one. As to Bower's trap, it is by no means a perfect device; at the same time I think that it is, for certain uses, the best we yet have; for certain others I prefer a trap where the ball is held to its place by gravity; for all uses I am hoping to see something better devised. I do not think, as Mr. Hellyer implies, that traps are to be unsealed by air passing *through* them (unless in continued strong currents) but that the unsealing is very likely to occur from the passage of air over the seals, not by "licking up," but by evaporation.

Mr. Hellyer asks if I am prepared to fix mechanical traps under water-closets. I am not, nor am I prepared to fix *any* trap *under* a water-closet in the ordinary sense. I believe that every water-closet should be trapped only in its bowl and there only with such a volume of water that even if siphoned out so as to take air freely there will still be an ample seal left when the passage of air ceases. Such a trap is always in sight. We see at once whether it is open or closed. We see, too, and this is very important, whether it is clean or foul. I have no numerical record of my observations, but I have had a good deal of experience in the inspection and observation of house drainage works, good and bad, and I think it is safe to say that the cases of bad trapping which I should consider it necessary to relieve by venting have not amounted to more than one per cent of the whole.

Mr. Hellyer thinks that I am "halting in my onward march to put my foot down upon the vent-hole of a trap." Not so; I am asking sanitary authorities and sanitary writers to hold their hands until they are sure they are right, and, as the preponderance of influence is being exerted in the other direction, I try to state as clearly as I can the reasons why I think that a possible *ignis fatuus* should not be followed in this darker part of our journey. Perfection in plumbing work has not yet been reached even in England, neither has a basis for such very confident assertions concerning it as we not unfrequently see both there and here. We shall all of us, if we are wise, be very modest in our assertions, not insisting, even though we have the authority of a dozen Boards of Health for our support, on the infallibility of methods which others question.

GEO. E. WARING, JR.

NOTES AND CLIPPINGS.

THE KINZUA VIADUCT. — For the purpose of correcting certain misapprehensions Mr. C. H. Keefer, assistant engineer of the construction of the Kinzua Viaduct, writes to the Philadelphia *Press* as follows: "There are several cases where chasms very much deeper than the Kinzua Valley, at the point where it is crossed by the Kinzua Viaduct, have been bridged, but in such cases, although the bridge is at a very great height above the bottom of the chasm, the span is sufficiently long to be supported on either side without requiring an intermediate pier or support in the deepest part of the chasm. In the Kinzua Viaduct not only was a valley nearly half a mile in width and over three hundred feet in depth bridged, but as the spans were short (sixty feet), twenty iron towers, which take the place of piers, are required to furnish them with the necessary points of support. Several of these towers are in the deepest part of the valley, and all were built on sections or stays from the ground up, until their requisite height was obtained, each section as it was built furnishing the workmen facilities to hoist the one next above into position; in this way the iron, with the aid of hoisting engines and nearly thirty miles of rope, gradually grew from the ground up until a height of over three hundred feet from the ground, at the base of the highest towers, was attained. From this it will be seen that it was a much more difficult problem to erect a bridge from the ground up to this height than to design and erect bridges over deeper chasms, which could be crossed with a single span, and would furnish good facilities for supporting the bridge on either side without piers or intermediate supports. With regard to the "Kinzua wooden girders," calling them wooden is clearly a mistake, as they are made of the very best quality of wrought-iron, and inspection of them will convince, without the assurance which actual test and knowledge of their strength give, that they are as strong as could be desired, and likely to retain their usefulness for very many years to come. The viaduct has been built in a most substantial and thorough manner, of as imperishable materials as can be obtained, and is a type of the best American engineering practice of the day, as well as an example of modern constructional skill."

SAND-BOX FOR LOWERING THE CENTRES OF ARCHES. — For striking the centres of a four-span bridge over the Tamal River, in the Midnapore district, there was required for holding the sand an entirely closed receptacle, which would gradually collapse as the weight came upon it — bags, open cylindrical or rectangular boxes being unsuitable under the conditions. After considerable thought, it struck the author that empty kerosene-oil tins would answer the purpose, and if so, hardly anything could be cheaper, as they only cost one anna per tin. The weight which the tins filled with sand would sustain without collapsing having been ascertained by experiment, a sufficient number were placed on the top of masonry pillars and were inclosed by masonry in mud-mortar, so as to prevent their being tampered with. This was also needed as a reserve support in case of a tin bursting through faulty construction. The kerosene-oil tin "sand-boxes" were made to carry the centres by templates and pillar-plates, as usual; and to allow of the immediate collapse on the sand being removed, the templates were made of such a size as to lie within the box. In striking the centres, the casing-bricks were first removed. Coolies, armed with short and sharp-pointed pegs of hard wood and ordinary hand-hammers, were stationed at each box. At a given signal every man struck a hole at the side of his box, and on the pegs being simultaneously removed, and another hole made at the top of the tin, the sand ran out. The lowering, which was very easy and gradual, could be arrested at any point by allowing the sand to accumulate in front of the holes. One side could also be lowered quicker than the other by simply driving another hole into the box and increasing the flow of sand. The maximum weight supported by one of the kerosene-oil tins used was, by calculation, 7.7 tons. No bulging or crushing was perceptible before the sand was run out. — *Professional Papers on Indian Engineering.*

Mexican Houses.—A correspondent of the London *Times*, writing from Mexico, says: "Springer, the capital of Colfax County, 716 miles from Kansas City, although surrounded by superior sandstone and some limestone rocks, at present consists of a few frame houses and some log shanties, interspersed with the true Mexican edifice, constructed of adobes, or bricks made of mud and water. The blocks, roughly cast in moulds, are usually about four times the size of an English brick, and are sun-dried. In this almost rainless climate these dried mud-blocks are wonderfully durable; I have seen walls made of them 300 years ago still in good preservation. For the poorer class of Mexican dwelling, often about 12′ x 16′, these adobes are usually placed singly, making a ten to twelve inch wall, held together by a little mud mortar. At an elevation of eight to ten feet, fir poles or rough-sawn timber are laid from the front to the back walls, some of them projecting without any regard to uniformity, two or three feet, and proving useful supports for suspending a pig, tools, drying clothes, or even the baby in its basket. The walls are carried about a foot above the roof-timbers, on which are generally tacked rough boards, covered with a grouting of several inches of mud and gravel, from which rain is run off by a few wooden spouts or merely by holes left in the wall immediately over the rafters. Many of the older adobes are without a window, and the doorway, without the superfluity of a frame, is sometimes closed, as required, by a buffalo hide or other curtain. A fireplace is not always provided, cooking often being done in a small beehive-like oven, placed outside. The internal arrangements of such a dwelling—thousands of which are met with throughout New and Old Mexico—are of the simplest description. In many of the poorer houses in remote localities the beds, if such they can be called, are of hides (laid on the clean-swept dirt floor), conveniently shaken and folded away when the occupants are astir. Many are still without either table or chair, for which a few rough stools are sometimes substituted."

Nobel's Dynamite and Explosives Factory.—The dynamite manufactory of Mr. Nobel is located at Ardeer on the Ayrshire coast, and in regard to it the London *Graphic* speaks as follows: "The works cover nearly a square mile in area, the buildings being scattered about like the shanties in an embryo American city, large structures and small ones, some of brick, and some of wood, but no two are together. There are about two hundred and fifty workers in all, women as well as men being employed. Immediately on passing the policeman at the gate, the workers enter into cottages for the purpose of changing their costumes, and now appear in different colored uniforms, some of the men being clad in bright scarlet, some in blue, but the majority wear clothes of a more sombre color. Once the gates close upon them in the morning, the operatives are shut in for the day. Not until night do they resume their ordinary clothes, and pass outward to their homes. The women are chiefly employed in making the dynamite into cartridges. The place is pervaded by the resolution to minimize the risk of explosion, and, in consequence, not only is every little hut in which the operation is conducted separated from its neighbors, but no more than four women are allowed in each. The distinctive clothing is another precaution, although its use is more obvious in the case of the men than the women. There are grave reasons why the men in red should be separated from the men in blue, and the men in white flannel from either of the other two. The mere cutting up and packing is simple, and comparatively safe, but there are intricate processes connected with the preparation of the explosive portion of the compound, which if not carefully watched are dangerous; and, as the garb he wears is an index to the work he is doing, it is easy to find out a man who strays from his own department into another. Four policemen from the county police force, paid by the company, are constantly on the watch to prevent dereliction of duty. They speak to no one, and are not to be spoken to. At uncertain intervals, also, there comes into the place a Government official, who sees whether the regulations laid down by Act of Parliament are faithfully adhered to. Each department of the place has an overseer, and over all is a manager, whose wide practical knowledge is such that he can be appealed to on every subject connected with the manufacture. That it is a profitable undertaking in which the company is engaged is apparent from the high premium on the original shares, and that the product has become a resource of civilization is shown by the demand for it from all parts of the globe, where man, warring with nature, is uprooting the stumps of trees, levelling the rock that comes between him and a straight path, breaking into the seam of the coal that is to cook his dinner, or making deep and navigable the stream that gives him communication with his neighbor."

The old Albany Capitol.—An advertisement published under authority of Capitol Commissioner Perry, stated that sealed proposals would be received at his office until noon of Wednesday, July 25, for the purchase and removal of the old Capitol building. Parties purchasing the same are to take down the building and remove the materials on or before October 1, 1883. At the beginning of this century, and probably within the memory of men now living, an ordinary four-story stone building, "with dormer windows and the Albanian gable ends," situate on the corner of Hudson Avenue and Broadway, and called the Stadt Haus or City Hall, served to accommodate the municipal bureaus of the city of Albany, the courts of the county, the county jail, and the Legislature of the State. And "in its yard stood the whipping-post and pillory." In 1803, these quarters becoming crowded, the Common Council of the city passed a resolution praying the Legislature to erect a new State and Court house on the public square, which was also called "Pinkster Hill," because of the annual congregation of slaves upon its summit for the celebration of the pinkster festivities in May. After agitation and careful compilations of the probable cost of such an enterprise, the Legislature, on April 3, 1804, passed an act entitled, "An Act making provision for improving Hudson's River below Albany, and for other purposes," one of which "purposes" turned out to be the erection of the Capitol building. By this act John Taylor, Daniel Hale, Philip S. Van Rensselaer, Simeon De Witt, and Nicholas N. Quackenbush were appointed commissioners to erect a building "with sufficient and commodious apartments for the Legislature, the Council of Revision, the courts of justice, and the Common Council of the city of Albany." The act provided for the sale of the Stadt Haus and grounds for the best price and on the best terms, the moneys arising from such sale to be applied to the new enterprise; it also authorized the Supervisors of the city and county of Albany to lay a tax of $3,000 upon the freeholders and the inhabitants of the county of Albany, exclusive of the city, and an additional tax of $3,000 upon the freeholders and inhabitants of the city itself, for the purposes of the new building. It was further enacted "that the managers of the lotteries . . . shall cause to be raised by lottery the further sum of $12,000, which sum when raised the said managers shall pay unto the said commissioners for the purposes aforesaid." Under the lottery system at that time all the public improvements of the State were conducted. In the construction of the old capitol, estimates were made from year to year, and found inadequate. The building was completed in 1814. Its total cost was $110,685.42, of which $73,485.42 was paid by the State, $34,200 by Albany City, and $3,000 by Albany County. The commissioners, in the Supply Bill for 1814, were allowed one per cent of the money expended for their services. Albany held an interest in the grounds and building until 1829, when an act was passed authorizing the payment of $17,500 to the city and county, on condition that all their rights and interests in the Capitol and park should be released, which terms were accepted. When completed, the building was considered one of great magnificence, and it challenged the admiration of travellers and tourists for years.—*Albany Argus.*

Egyptian Discoveries in Rome.—The Via di S. Ignazio is a short, narrow lane, which leads from the Collegio Romano to the tribune of S. Maria sopra Minerva, crossing a portion of the ground formerly occupied by the "Iseum et Serapeum" of the ninth region. Every time excavations have been made on either side of the lane, to build or to restore the houses which line it, some beautiful specimens of Egyptian workmanship have been brought to light. Considering that no excavations had ever been made underneath the public ground, and considering there was no reason why, in the very centre of such promising land, other relics of the famous sanctuary should not exist, I asked the Archæological Municipal Commission to try the experiment, and my proposal was accepted at once. The works began on Monday, the 11th—hard and difficult works, because we had to dig to a depth of twenty feet between houses of very doubtful solidity, propping everything on every side. First to appear, at the end of the third day, was a magnificent sphinx in black basalt, the portrait of King Amasis. It is a chef d'œuvre of the Saïtic period, brought to perfection in the smallest details, and still more interesting for its historical connection with the conquest of Egypt by Cambyses. The cartouches bearing the king's name appear to have been hammered, although not so completely as to render it unintelligible. The nose, likewise, and the *ureus*, the symbol of royalty, were injured at the same time. The explanation of such circumstances is given by Herodotus. When Cambyses occupied Sais, Amasis had just been buried. The conqueror caused the body to be removed from the tomb, to be flogged and otherwise insulted, and finally to be burned, the maximum of profanation from an Egyptian point of view. His name was erased from the monuments which bore it, a natural consequence of the "memoriæ damnatio." This sphinx is the surviving testimonial of that eventful catastrophe. When, six or seven centuries later, a Roman governor of Egypt, or a Roman merchant from the same province, singled out this work of art to be shipped over to Rome as a votive offer to the Iseum Campense, ignorant of the historical value of its mutilations, he had the nose and the *ureus* carefully restored. Now both are gone again; there is no danger of a second restoration. I may remark, as a curious coincidence, that as the name of Amasis is erased from the sphinx, so the name of Hophries, his predecessor, is erased from the obelisk of Minerva found in the same Iseum. In these two monuments we possess a synopsis of Egyptian history between 595 and 526 B. C. The second work, discovered on June 17, is an obelisk of red granite, inscribed with hieroglyphics. The lower portion only appears on the side of the trench, and we are still anxious to ascertain whether it is broken or not. If the monolith is entire, it will be of the same size as the one in the Piazza della Rotonda. The cartouches show the name of Ramses II, the Sesostris of the Greeks. We thought at first that the obelisk, like that of the Pantheon, was a Roman imitation; but Professor Schiaparelli, the eminent Egyptologist, who came over from Florence at the first notice of these extraordinary findings, considers it to be an original work, which would belong, accordingly, to the fourteenth century before the Christian era.—*Rodolfo Lanciani, in the Athenæum, June 30.*

Flooding the Desert of Sahara.—The possible changes in the climate of Europe which may follow the flooding of the Desert of Sahara have been again the subject of discussion since M. de Lesseps's recent and more modest scheme has been announced. There is one aspect of the question which has not yet, so far as I know, been considered. It seems to have been taken for granted that the influx of the waters of the Mediterranean to the regions now dry, parts of which lie fully a thousand feet below the sea level (if recent surveys may be trusted) will take place nearly as quickly and as comfortably as the filling up of the Suez Canal when the barriers which had kept out the waters of the Mediterranean and Red Seas were successively removed. But if we can judge from what is observed in the case of Niagara, it is probable that the inrush will take some time, and be accompanied by some little disturbance. Niagara may be regarded as letting out the waters of Lake Erie into Ontario. Considering the limited amount of work done in this way by Niagara, and the disturbance and uproar accompanying that work, one is disposed to await with interest the effect of letting the waters of the Mediterranean into the lower parts of the Sahara. It may safely be predicted that, whatever inlet is cut by man, a much larger one will be forced by nature before a hundredth part of the work of indraught has been effected.—*Contemporary Review.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

281,235. Fire-Escape.—Samuel H. Bingham, Laurelton, Pa.

281,247. Key-Fastener. — Washington Dewey, Chicago, Ill.

281,252. Saw. — James E. Emerson, Beaver Falls, Pa.

281,255. Folding or Cabinet Bath-Tub.—Franklin H. Fickett and John W. Reid, Chicago, Ill.

281,267. Artificer's Levelling-Instrument. — John W. Harmon, Boston, Mass.

281,291. Sash-Fastener. — Henry S. Ohl, Jr., Philadelphia, Pa.

281,308. Parlor-Door Hanger.—Samuel Schreffler, Jr., Joliet, Ill.

281,318. Wrench. — Benjamin F. Stockford, Sturgis, Mich.

281,326. Malt-Kiln Floor. — Paul Weinig, Hanau, Prussia, Germany.

281,379. Window-Sash. — Theodore F. Lang, Baltimore, Md.

281,395. Plaster Compound for the Manufacture of Stone, Tile, etc. — Emile Pick, Paris, France.

281,418. Tool-Handle. — Sigourney Wales, Cambridge, Mass.

281,431-432. Wrench. — William Baxter, Jersey City, N. J.

281,433. Sliding Door. — Alvah P. Beard, Horseheads, N. Y.

281,447. Saw-Handle. — Frank A. Buell, Brooklyn, N. Y.

281,456. Sliding-Jaw Wrench. — George J. Cline, Goshen, Ind.

281,458. Sash-Holder. — William Conner, Missouri Valley, Iowa.

281,463. Vise. — John C. Coram, Lowell, Mass.

281,467. Fire-proof Ceiling. — P. J. Leonard de Rache, New York, N. Y.

281,488. Fire-Escape. — Emile Gerot, Buffalo, N. Y.

281,504. Door-Check. — Silas B. Hazen and Geo. L. Van Gorder, Winamac, Ind.

281,537. Door-Hanger. — Eugene Mack, Addison, Oakland County, Mich.

281,542. Door-Check. — George G. Matthews and Rudolph Matthews, Wichita, Kans.

281,546. Door-Hanger. — Henry T. Moody, Newburyport, Mass.

281,549. Fire-Escape. — William Nack, Sheboygan, Wis.

281,550. Safety Device for Elevators. — Cassius C. Palmer, Oakland, Cal.

281,551. Hot-Air Furnace. — Henry J. Pelstring, Philadelphia, Pa.

281,557. Fire-Escape.—Henry Redden, New York, N. Y.

281,568. Extension-Shank for Bits.—C. Schoch, Truckee, Cal.

281,594. Spring-Hinge. — William H. Williams, Brooklyn, N. Y.

281,615. Lock. — Frank S. Clarkson, Baltimore, Md.

281,630. Shutter-worker. — Henry J. Hunsicker, Laurelton, Pa.

281,632. Automatic Door for Elevator Hatchways. — Michael F. Kidd, Baltimore, Md.

281,645. Chimney-Top. —Anderson Rosenstar, New York, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

Dwellings. — Wm. H. Marriott, architect, has prepared drawings for D. D. Mallory and mother, for 2 two-st'y brick houses, with stone and terra-cotta finish, to be built cor. Eutaw Pl. and Robert St., and to cost $35,000.

Jacob Saum, builder, is to erect 11 three-st'y and basement brick dwells., on the n s Union Sq., cost, $3,500 each, from designs by W. Claude Frederic, architect.

Building Permits. — Since our last report twenty-three permits have been granted, the more important of which are the following: —

Francis White, three-st'y brick building, e s Gay St., between Aisquith and Forrest Sts.

Caspar Folke, three-st'y brick building, w s Charles St., between Hamburg and Cross Sts.

Harrison O. Wilbur, three-st'y brick building, w s Light St., between Cross and Weber Sts.

F. D. Sauerwein, 7 two-st'y brick buildings, e s Fulton St., between Lorman and Presstman Sts., and 9 two-st'y brick buildings, e s Fulton St., between Lorman St. and Patterson Ave.

Dr. C. W. Benson, three-st'y brick building, e s Howard St., between Centre and Franklin Sts.

Addition and Alteration. — W. Claude Frederic, architect, has prepared plans for an alteration and addition to the property of Richard Stumpf, Esq., cor. Wolfe and Baltimore Sts., to cost $3,000; Wm. Goldbeck & Son, builders.

Boston.

Building Permits. —*Brick.* — *High St., Nos.* 143 *and* 145, Ward 12, for John Goldthwait, mercantile, 30′ x 90′, five-st'y flat; A. Ripley, builder.

Stanhope St., No. 17, Ward 11, for Edward W. Murray, stable, 30′ x 80′, four-st'y flat; Laming & Drisko, builders.

Commercial St., No. 494, Ward 6, for Nathan Robbins, mercantile, 31′ x 80′, four-st'y flat; John Kelley, builder.

Moreland St., cor. Copeland St., Ward 21, for Abbie E. Hoxie, dwell., 41′ x 41′, two-st'y pitch; ell, 20′ x 25′; Rumery & Maxwell, builders.

Western Ave., Ward 25, for Glidden W. Joy & Co., 5 storehouses, 15′ x 35′, 35′ x 35′, 26′ 6″ x 30′, 35′ x 35′, and 30′ x 40′, one-st'y flat.

Wood. — Hampshire St., No. 22, Ward 19, for Solomon Sanborn, dwell., 21′ x 29′ and 14′ x 15′, two-st'y mansard; Solomon Sanborn, builder.

Norfolk St., near Walk Hill St., Ward 24, for Edward F. Chamberlain, two-st'y pitch; John J. McNutt, builder.

Harvard St., cor. Wales St., Ward 24, for Hiram Orcutt, dwell., 31′ 6″ x 31′ 6″ and 15′ x 21′, two-st'y pitch; J. H. Burt & Co., builders.

Fairfax St., near Carruth St., Ward 24; for H. S. Carruth, dwell., 31′ 6″ x 31′ 6″, two-st'y hip.

Beaumont St., near Carruth St., Ward 24, for H. S. Carruth, dwell., 26′ x 33′ and 14′ x 18′ 6″, two-st'y pitch; A. H. Vinal, builder.

Terrace Ave., near Sheridan Ave., Ward 23, for Andrew Cassidy, dwell., 22′ x 30′ and 14′ x 14′, two-st'y pitch; Andrew Cassidy, builder.

Marcella St., No. 18, Ward 21, for Mrs. P. D. Ladd, dwell., 21′ 6″ x 52′, two-st'y pitch; E. F. Brown, builder.

Ruggles St., No. 78, Ward 19, for Lansing Mills, storage, 16′ x 24′, one-st'y pitch; W. S. Mitchell, builder.

Buttonwood St., near Mt. Vernon St., Ward 15, for Morris Welch, stable, 15′ x 15′, one-st'y pitch; Morris Welch, builder.

Decatur Ct., near Decatur St., Ward 3, for Chas. Butler, stable, 27′ x 63′, three-st'y flat; Geo. E. Morrill, builder.

Albion St., near Dudley St., Ward 20, for Edgar A. Neal, dwell., 30′ x 45′, three-st'y mansard; F. J. Portunato, builder.

Wall St., No. 25, Ward 5, for John Donovan, stable, 28′ x 44′, two-st'y flat; John Donovan, builder.

Brooklyn.

Building Permits. — *Leonard St.*, s e cor. Withers St., 2 three-st'y frame dwells., tin roofs; cost, each, $3,000; owner, D. Carroll, cor. Leonard and Jackson Sts.; architect, A. Herbert; builders, W. & T. Lamb.

Hart St., s s, 175′ n Stuyvesant Ave., two-st'y and basement frame dwell., tin roof; cost, $3,000; owner and builder, W. A. Schmitthenner, 390 Hart St.; architect, John Herr.

Twelfth St., e s, 75′ s Fifth Ave., two-st'y and basement brick dwell., tin roof, iron cornice; cost, $5,700; owner, J. A. Backman, cor. Twelfth St. and Fifth Ave.; architect, Jno. Platte; builder, John Auer.

Halsey St., s e cor. Reid Ave., three-st'y brick store and dwell., gravel roof; cost, $9,000; owner and builder, M. E. Hall, 63 Patchen Ave.; architect, T. Floyd Thomas.

Union Ave., No. 11, three-st'y brick double tenement, tin roof and cornice; cost, $5,700; owner, Jno. Muryha, 11 Union Ave.; architect, J. Platte; builders, J. Auer and D. Kreusler.

Eckford St., No. 230, e s, 176′ s Meserole Ave., two-st'y frame tenement, gravel roof; cost, $3,000; owner and architect, Jacob Ritschey, on premises; builders, J. Cashman and A. Van Dien.

Berkeley Pl., s s, 190′ e Sixth Ave., 3 three-st'y brownstone front dwells., tin roofs; cost, each, $9,000; owners, architects and builders, Van Voast & Ward, 117 North Portland Ave.

Van Brunt St., No. 362, w s, 100′ n Wolcott St., four-st'y iron and brick store and tenement, tin roof; cost, $10,075; owner, Henry Patterson, 359 Van Brunt St.; architect, P. H. Gilvarry; builders, P. Kelly & Son and Gihrson & Siebrandt.

Fulton St., s s, 135′ e Tompkins Ave., 4 three-st'y brick stores and tenements, gravel roofs, iron cornices in rear; cost, each, $4,000; owner, A. S. Robbins, Sixth Ave., cor. Park Pl.; architect and carpenter, Jos. Platt; masons, J. Demott & Sons.

Pineapple St., Nos. 53 *and* 55, n s, 100′ e Hicks St., seven-st'y brick apartment-house, cement and gravel roof; cost, about $60,000; owner, Edwin D. Phelps, 71 and 73 Orange St.; architect, Samuel Curtiss; builders, E. T. Rutan and Morris & Selover.

Alteration. — *Fifth Ave.*, n e cor. Eighteenth St., raised one-st'y and three-st'y brick extension, and altered internally; cost, $5,298; owner, H. Scherloh, 639 Fifth Ave.; architect, W. H. Werth; builder, J. R. Anderson.

Chicago.

Apartment-House. — An apartment-house will be erected on Sedgwick St., by Anthony Hollinger, four-st'y; cost, $15,000.

Flats. — Jas. G. Gore will build, on State St., near Forty-seventh St., four-st'y building, for store and flats; cost, $25,000.

Houses. — Oscar Cobb is architect for Mr. Herman Goldsmith's building on Indiana St., near Dearborn St., three-st'y, of Lemont stone, to cost $25,000.

L. K. Smith is building a two-st'y house, on cor. of State and Schiller Sts., stone and brick; cost, $30,000.

William Jackson will build, on Forest Ave., 3 three-st'y dwells.; cost, $10,000.

William Thomas has made plans for house on Cottage Grove Ave., near Thirty-ninth St.; cost, $7,000.

Same architect has plans ready for two-st'y building for Alderman McAuley, on Halsted St., near Thirty-fifth St.; cost, $8,000.

G. W. Ackermann, architect, has on hand, for Dr. J. Simpson, house to be built on cor. of Hubbard St. and Western Ave., pressed-brick, cut-stone finish, two-st'y.

Theatre. — Oscar Cobb has prepared plans for theatre, cor. of Halsted and Jackson Sts.; cost, $65,000.

Building Permits. — Mr. McGuire, two-st'y and basement dwell., 245 Thirteenth Pl.; cost, $5,000; architect, P. W. Ruehl.

John Busse, two-st'y and basement dwell., 140 Henry St.; cost, $5,000; architect, P. W. Ruehl.

D. W. Jackson, 2 two-st'y dwells., 300 Vernon Ave.; cost, $13,000; architect, O. J. Perice.

C. Walsh, two-st'y barn, 54 and 56 Sherman St.; cost, $4,000.

L. A. Davis, warehouse, cor. Twentieth and Grove Sts.; cost, $8,000; builder, M. Mortimer.

Ogden School, three-st'y and basement schoolhouse; cost, $80,000; architect, Willett; builder, Wm. Crilly.

H. Luders, 6 two-st'y dwells., 581-591 Congress St.; cost, $12,000; architect, Strippleman; builders, B. & Sayer.

J. Voss, two-st'y and basement dwell., 339 West Erie St.; cost, $3,500.

Peter Wohler, two-st'y factory, 521 and 523 Twenty-first St.; cost, $40,000; architect and builder, Aug. Laula.

John Fitzgerald, two-st'y dwell., 3216 South Halsted St.; cost, $3,700.

Jauch & Zeigler, 2 two-st'y dwells., 622 and 624 Sedgwick St.; cost, $5,000; architect, Chas. Uther; builder, Chas. Buttcher.

L. B. Crumb, two-st'y and basement dwell., cor. Adams and Leavitt Sts.; cost, $4,000; architect, J. M. Van Osdel.

Jno. Schmitt, three-st'y and basement stores and flats, 318 Twelfth St.; cost, $8,000; architect, W. Ruhl.

Cathedral of Sts. Peter and Paul, two-st'y attic school and residence, 18 South Peoria St.; cost, $18,000; architects, Burling & Whitehouse.

Jno. Hendricks, two-st'y and basement flats, Twelfth St.; cost, $5,000; architect and builder, Jno. Hendricks.

N. Craig, three-st'y and basement dwell., 94 Ewing St.; cost, $6,000; architect, P. W. Ruehl; builder, B. & Sayer.

Wm. B. Raffe, two-st'y dwell., 527 Twelfth St.; cost, $4,000.

G. G. Bodner, two-st'y dwell., 484 Congress St.; cost, $6,000; architect, Jos. Bodner.

C. H. Sugnersen, two-st'y dwell. and barn, 3748-3750 Forest St.; cost, $10,000; architect, Theo. Karls; builder, B. H. Robinson.

J. B. Coan, two-st'y and basement dwell., 816 Hinman St.; cost, $4,100.

John Slegskal, three-st'y flats, 882 Milwaukee Ave.; cost, $10,000; architect, H. Key.

V. Mlejnek, two-st'y and basement dwell., 92 Farquer St.; cost, $4,500.

M. H. Cavaty, two-st'y and basement dwell., 103 Bunker St.; cost, $4,200.

D. J. Simpson, two-st'y dwell., 548 Hurlbert St.; cost, $3,500.

E. H. Gammon, three-st'y flats, 310 Monroe St.; cost, $10,000; architect, J. M. Van Osdell; builder, Hayden.

Henry Knapp, two-st'y and basement store and dwell., 387 West Chicago Ave.; cost, $6,000; architect, Henry Clay.

S. Cochran, two-st'y and basement dwell., 734 West Chicago Ave.; cost, $4,000.

Aug. Penten, 2 two-st'y dwells., 709-711 Noble St.; cost, $6,000.

G. Park Kenney, four-st'y flats; cost, $14,000.

J. E. French, 2 three-st'y dwells., 3847 and 3849 Michigan Ave.; cost, $17,000; architect, F. L. Charnley.

Peter Surher, two-st'y and basement store and dwells., Cornell St.; cost, $5,000.

Chicago W. D. Railway, two-st'y and basement barn, cor. Leavitt St.; cost, $30,000.

Chicago W. D. Railway, two st'y warehouse, Blue Island St., cor. Leavitt St.; cost, $20,000.

Thos. Wilee, dry kiln and barn, Allport St.; cost, $13,000.

John Szymossak, three-st'y flats, 706 Noble St.; cost, $6,000; architect, A. C., by builder, A. W. Rudnick.

Jno. Breeze, two-st'y and basement dwell., 164 Centre St.; cost, $3,000.

E. J. Lehman, four-st'y flats, 206 Sherman St.; cost, $10,000; architects, Treat & Foltz.

J. L. Addison, 2 three-st'y and basement dwells., 191 and 193 Schiller St.; cost, $18,000; architect, J. L. Addison; builder, Jno. Cox.

F. L. Schwerlgen, 2 two-st'y dwells., 106 and 108 and 108 Jay St.; cost, $3,000.

H. Anderson, 3 three-st'y and basement stores and dwells., 229-233 West Indiana St.; cost, $18,000; architect, C. O. Hanson; builder, J. C Anderson.

M. Selz, 3 three-st'y and basement dwells.; 1713 Michigan Ave.; cost, $20,000; architects, Adler & Sullivan; builder, H. Elmer.

F. P. Lump, two-st'y and basement flats, 1,000 West Twelfth St.; cost, $4,000.

Helen M. Barbour, three-st'y flats, 302 West Van Buren St.; cost, $8,000; architect, T. J. Queenbosh.

P. Mahlmann, two-st'y and basement flats, 338 Larrabee St.; cost, $5,000; architect, R. F. Boss.

Mrs. G. Rothschild, two-st'y and basement dwell., 3216 Michigan Ave.; cost, $8,000; architects, Cobb & Frost; builder, Geo. H. Fox.

R. Rubel, four-st'y and basement flats, 309 Clark St.; cost, $15,000; architects, Adler & Sullivan; builder, Geo. H. Fox.

W. R. Linn, two-st'y dwell., 2705-07 Michigan Ave.; cost, $35,000; architects, Burnham & Root; builder, D. Lane.

W. G. Jackson, 3 cottages, 1399-1407 Jackson St.; cost, $4,000.

Seipp Brewing Co., malt-house and elevator, Johnson St., cor. Twenty-seventh St.; cost, $11,000; architect, F. W. Wolff.

German M. E. Church, church-building, 2801-03 Portland Ave.; cost, $10,000; architect, E. Chapman; builders, Kreig & Demuth.

John Moeller & Sons, three-st'y store and flats, 313-315 Blue Island Ave.; cost, $9,000; architect, Wm. Strippleman; builder, A. Dresser.

P. M. Lagoni, three-st'y store, 690 North Ave.; cost, $10,000; architect, C. O. Hansen; builder, Geo. Peterson.

W. G. Jackson, 7 cottages; cost, each, $8,000; architect, C. L. Palmer.

A. B. Rowley, 2 two-st'y and base't dwells., 3420 Prairie Ave.; cost, $4,000.

J. W. Schmidt, 2 three-st'y flats, 179–181 Lasalle Ave.; cost, $10,000; architect, I. Zittell; builder, Chas. W. Hellman.

Jos. Green, two-st'y and base't shop and dwell., 74 and 76 Larrabee St.; cost, $8,000; architect, S. Otter; builder, A. Carlson.

S. E. Gross, 3 cottages, Ashland Ave.; cost, $3,000.

V. Mayer, two-st'y and base't dwell., 502 Nineteenth St.; cost, $4,000.

Kennedy, four-st'y bakery, 48–50 South Desplanes St.; cost, $16,000; architects, Adler & Sullivan; builder, W. U. Crilly.

Ryan & O'Brien, two-st'y dwell., 248 South Lincoln St.; cost, $3,200; builder, M. Dougherty.

L. Burroughs, three-st'y store and dwell., 500 West Madison St.; cost, $5,000; architect, C. Stiles; builder, J. Rutherford.

Stephen Eireiner, two-st'y dwell. and store, 1025 Thirty-first St.; cost, $8,000; architect, L. H. Heine; builders, Benes & Sayer.

Henry Koeber, three-st'y store and dwell., 456 West Twelfth St.; cost, $7,500; architect, P. W. Ruehl; builders, Benes & Sayer.

F. E. Lowther, 4 cottages, cor. West Adams and California Ave.; cost, $6,000.

Charles Counselman, ten-st'y office-building, cor. Jackson and Lasalle Sts.; cost, $100,000; architects, Burnham & Root; builder, B. E. Sturtevant.

C. B. Holmes, three-st'y and base't stores and dwell., 239–245 Clybourn Ave.: cost, $25,000; architect, M. G. Hallberg; builder, A. Fagerlund.

Frank Gasono, two-st'y store and dwell., 2928 Cottage Grove Ave.; cost, $3,000.

Mrs. Mary Baura, two-st'y dwell., 160 De Koven St.; cost, $3,500.

Mrs. Mary Carroll, two-st'y flats, 523 Taylor St.; cost, $4,000.

J. Burk, two-st'y dwell., 796 North Mobey St.; cost, $3,000.

Chas. Tarno, two-st'y dwell., 33 Hastings St.; cost, $3,700.

Henry Wederkind, two-st'y store and dwell., 1070 Milwaukee Ave.; cost, $4,500.

John Hollowed, two-st'y store and dwell., 744 Van Buren St.; cost, $5,000: builder, C. P. McKay.

Union Mutual Insurance Co., 5 two-st'y dwells., 501–509 Webster Ave.; cost, $25,000; architect, J. J. Flanders.

Richard Letsche, two-st'y store and dwell., 319 North Avenue; cost, $4,000.

John Gerstetter, three-st'y flats, 871–875 Indiana St.; cost, $18,000; architect, W. Strippleman; builders, Gross & Hoppe.

M. D. Stecher, two-st'y and base't dwell., 74 Lincoln Ave.; cost, $6,000; architect, C. O. Hansen, builder, B. Oleson.

A. W. Cook, three-st'y flats, 545 North Clark St.; cost, $6,000; architect, C. P. Thomas; builder, N. Gorten.

F. Hall, three-st'y dwell., 22 Walton Place; cost, $6,000; architects, W. A. & A. E. Wells.

B. Leger, two-st'y store and dwell., 500 West Chicago Ave.; cost, $3,500.

Wm. Peters, two-st'y flats, 400 Noble St.; cost, $3,500.

C. H. Jordan, three-st'y and basement stores and flats, 744–46 Madison St.; cost, $12,000; architect, A. M. F. Cotton; builder, W. K. Barton.

H. A. Streeter, four-st'y and basement factory, 35–41 East Indiana St.; cost, $14,000; architect, M. L. Beers; builder, T. Nicholson.

Amasa Orelup, 4 three-st'y dwells., 3152–54 Groveland Park Ave.; cost, $20,000; architect, J. N. Tilton; builder, A. Orelup.

H. Grassie, three-st'y brick flats, 663 West Washington St.: cost, $10,000; architect, A. Smith; builder, J. P. Jones.

Mrs. Laura Anderson, three-st'y and base't printing house, 185–187 North Peoria St.; cost, $30,000; architect, H. M. Hansom; builders, Bullock & Son.

Wm. Pauly, three-st'y flats, 43 Goette St.; cost, $3,500.

New York.

Apartment-Houses.—The foundations for the last four of the "Navarro" apartment-houses, on Fifty-eighth and Fifty-ninth Sts., between Sixth and Seventh Aves., are now being laid; the contracts for the buildings are not yet awarded.

Fever Hospital.—At the foot of East Sixteenth St., a fever hospital, 85′ x 125′, of brick, is to be built for the Board of Health, at an expense of about $50,000, from designs of Mr. C. C. Haight.

Hall.—The old St. Francis Xavier Church, on the south side of Sixteenth St., e of Sixth Ave., is to be altered into a building to be known as College Hall, for concerts, lectures, etc. The basement is to be reserved for Sunday-school class-rooms. Messrs. N. Le Brun & Son are the architects.

Hotel.—For Mr. J. P. Earle, a hotel, to cost $250,000, is to be built, from designs of Mr. W. H. Hume.

Theatres.—Preliminary plans have been drawn for Mr. Cheever, by Mr. Bruce Price, for a Vaudeville theatre, which it is proposed to build on the n s of Twenty-seventh St., between Fifth Ave. and Broadway, at an expense of about $60,000.

Mr. John Stetson has had plans prepared by Mr. Geo. Edward Harding, for a new entrance to the Fifth Avenue Theatre.

Building Permits.—*One Hundred and Thirty-fifth St.*, n s, 235′ w Fifth Ave., 3 three-st'y brownstone front dwells., tin roofs; cost, each, $9,500; owner, Charles White, 223 Keep St., Brooklyn; architect, Andrew Spence.

Fifth Ave., s e cor. One Hundred and Twenty-eighth St., 4 four-st'y brownstone front dwells., tin roofs; cost, each, $15,000; owner, Helena M. Edmunstone, 64 Pulaski St., Brooklyn; architect, R. B. Eastman.

Broadway, Nos. 1237 *and* 1239, 2 brick buildings, store, rear theatre, three-st'y metal roofs; cost, each, $30,000; owner, Edward F. James, 832 Seventh Ave.; architects, J. B. McElfatrick & Son; builders, Jno. Mooney and John P. Decker.

One Hundred and Twenty-eighth St., s s, 80′ w Fifth Ave., three-st'y brownstone front dwell., tin roof; cost, $12,000; owner and architect, same as last.

Orchard St., n s, 200′ e Madison Ave. (Fordham), two-st'y frame dwell., shingle roof; cost, $3,850; owner, John J. Jefferson, 278 Alexander Ave.; architect, Edgar P. Hatfield; builder, Louis Falk.

Forty-seventh St., s s, 330′ 6″ w Eighth Ave., 2 five-st'y brownstone front flats, tin roofs; cost, $18,500 and $16,000; owner, Fred. Schuck, 516 East Eighty-fifth St.; architect, John Brandt.

Forty-seventh St., s s, 150′ w Eighth Ave., four-st'y rear brick factory, tin roof; cost, $25,000; owner and architect, same as last.

West Fifty-second St., Nos. 515, 517 *and* 519, 3 five-st'y brick tenements, tin roof; cost, each, $15,500; owner, Elworth L. Striker, 360′ w Fifty-first St.; architect, John Brandt; builders, John A. O'Connor & Co.

Park Row, No. 37, cor. Beekman and Nassau Sts., eleven-st'y brick office-building, tiles or tin roof; cost, $700,000; owner, Orlando B. Potter, 26 Lafayette Pl.; architect, N. G. Starkweather; mason, Thos. Armstrong.

Third Ave., w s, 50′ n One Hundred and Seventh St., 3 five-st'y brick flats and stores, tin roofs; cost, each, $24,000; owner, Catharine Fettrich, 148 West One Hundred and Twenty-fifth St.; architect, G. Robinson, Jr.

Broadway, w s, 300′ s Kingsbridge Ave., two-st'y frame dwell., slate roof; cost, $3,000; owner and builder, Francis M. Varian, Kingsbridge.

Grand St., n w cor. Mercer St., five-st'y brick store, tin roof; cost, $15,000; owner, Jas. S. Bearns, 80′ s Tenth St., Brooklyn; architect, Julius Kastner.

Vanderbilt Ave., s w cor. Forty-fifth St., three-st'y brick office, tin roof; cost, $12,500; lessees, American Express Co., 65 Broadway; architect, Edward H. Kendall.

Waverly Pl., Nos. 188–194, 3 five-st'y brownstone front tenements, tin roofs; cost, each, $8,000; owner, Theresa Schuppart, 508 East Eighty-eighth St.; architect, John C. Burne; builder, John Schuppan.

One Hundred and Thirtieth St., n s, bet. Cliff and Ninth Aves., 6 three-st'y brick dwells., tin roofs; cost, total, $55,000; owner, Female Academy of the Sacred Heart, Madam Sarah Jones, president, 583 Madison Ave.; architect, Wm. Schickel.

East Eighteenth St., Nos. 9, 11, *and* 13, five-st'y and basement brick and iron store, brick roof; cost, $160,000; owners, Richard Arnold and Henrietta Constable, Fifth Ave., cor. Nineteenth St.; architect, Wm. Schickel; builder, Max Eidlitz.

One Hundred and Thirty-ninth St., n s, 156′ w Willis Ave., 3 three-st'y brick dwells., tin roofs; cost, each, $6,000; owner, Wm. T. Onderdonk, One Hundred and Thirty-fifth St., bet. Alexander and Lincoln Aves.; architect, John Rogers.

One Hundred and Sixty-fifth St., n s, 125′ e Tenth Ave., three-st'y brick dwell., tin roof; cost, $3,000; owner, Fred. Schunke, 525 West Fifty-second St.; architect, E. J. Conway; builders, C. R. Terwilliger and E. J. Conway.

Greene St., Nos. 142 *and* 144, six-st'y brick and iron front store, gravel roof; cost, $50,000; owner, John J. Atlhouse, 66 West Forty-ninth St.; architect, Wm. E. Worthen.

Greene St., Nos. 153, 155 *and* 157, *and West Houston St., No.* 55, six-st'y brick store, slate and tin roofs; cost, $80,000; for owner, Hugh N. Camp, agent, 152 Broadway; architect, A. C. Neuman; builders, R. Deeves and Christie & Dykes.

Seventy-eighth St., n s, 300′ w Ave. A, 2 four-st'y brick tenements, tin roofs; cost, each, $16,500; owner, Aug. Schwaizler, 401 West Forty-first St.; architect, John Brandt.

Ninth Ave., s w cor. Twenty-fifth St., six-st'y brick factory, tin roof; owner, Fred N. Du Bois, One Hundred and Fifty-fifth St., cor. St. Nicholas Ave.; architect, M. C. Merritt.

Alteration.—*East Fiftieth St., No.* 307, three-st'y brick extension; cost, $3,000; owner, Fred Sulzberger, on premises; architect, John McIntyre; builder, Robt. Huson.

Philadelphia.

Building Permits.—*Library St.*, above Fourth St., six-st'y hall, 53′ x 120′; Thos. McCarty, contractor.

McClellan St., w of Eleventh St., two-st'y dwell., 16′ x 38′; Chas. McClellan, owner.

Ross St., No. 1025, two-st'y building, 14′ x 30′; Frank Bresling, owner.

Eighth St., n of Thompson St., 2 three-st'y dwells., 17′ x 53′: Geo. Watson, contractor.

Fifteenth St., n w cor. Columbia Ave., laundry building, 22′ x 76′; W. D. Carter, contractor.

Second St., n of Susquehanna Ave., three-st'y dwell., 18′ x 46′; Geo. Kessler, contractor.

Eighth St., cor. Hoffman St., 4 two-st'y dwells., 15′ x 40′; Joseph Stuckey, contractor.

Twenty-third St., n w cor. Race St., two-st'y machine shop, 37′ x 91′; W. L. Atkinson, contractor.

Fourth St., n of Columbia Ave., five-st'y addition to factory, 24′ x 48′; John B. Stetson, owner.

Fountain St., e of Sixteenth St., 13 two-st'y dwells., 14′ x 46′; M. Carey Lee, owner.

Cumberland St., bet. Mill and Coulter Sts., one-st'y saw and planing mill, 50′ x 60′.

Lehigh Ave., s w cor. Edgemont St., second-st'y addition to car-house, 90′ x 119′; W. Holloway, contractor.

Newkirk St., Nos. 1369 *and* 1371, 2 two-st'y dwells., 18′ x 26′; W. Holloway, contractor.

Front St., n of Arch St., second-st'y to store, 28′ x 60′; also on Clementine St., w of Frankford Road, two-st'y dye-house, 16′ x 40′; S. R. Stewart, contractor.

Forty-first St., cor. Spring Garden St., second-st'y addition to church, 50′ x 100′; Philip Rudolph, trustee.

Huntingdon St., n w cor. Sepviva St., 7 two-st'y dwells., 1, with store, 18′ x 23′; 2, 16′ x 33′; 4, 13′ x 33′; Thos. L. Kelly, contractor.

Martha St., s of Lehigh Ave., two-st'y dwell., 16′ x 38′; J. C. Stackhouse.

Reese St., n of Lehigh Ave., 3 two-st'y dwells., 16′ x 42′; also on Fifth St., n of Lehigh Ave., 2 two-st'y dwells., 17′ x 42′; Jacob Ebner, contractor.

Atlantic St., w of Seventeenth St., 6 two-st'y dwells., 13′ x 36′; J. W. Christian, owner.

Locust St., above Thirty-ninth St., second-st'y addition to Sunday-school building, 38′ x 70′; J. W. Leamy, contractor.

Pine St., w of Thirty-sixth St., college building, 22′ x 118′; Jacob Myers, contractor.

Third St., s e cor. Norris St., market house, 77′ x 228′; Eldridge & Stewart, contractors.

Tasker St., Nos. 1008 *and* 1010, 2 two-st'y dwells., 16′ x 46′; Harris & Shurlock, contractors.

East York St., No. 829, three-st'y dwell., 14′ x 46′; Liggett & Watson, contractors.

Albion St., n of Locust St., three-st'y stable, 18′ x 52′; Thos. Little & Son.

Front Ave., n e cor. Fairmount Ave., five-st'y addition to factory, and three add. stories to same; S. Humphries, contractor.

Brandywine St., bet. Eighteenth and Nineteenth Sts., two-st'y stable, 30′ x 36′; W. J. Vankirk, contractor.

Scott St., No. 1933, two-st'y dwell., 16′ x 24′; Jno. Spoer, contractor.

Thirty-sixth St., n of Race St., three-st'y dwell., 33′ x 62′; F. G. Thorn, owner.

Queen St., bet. Morris & Township line, two-st'y dwell., 17′ x 30′; C. Naeman, owner.

Maple Ave., e of Sixty-second St., two-st'y dwell., 16′ x 32′; also, on Pine St., w of Sixty-first St., two-st'y dwell., 16′ x 45′; Jacob Yell, contractor.

Ridge Ave., Nos. 3278, 3280, 3282, 3284, *and* 3286, 5 three-st'y stores and dwells., 20′ x 50′; Chas. Bartle, contractor.

Federal St., e of Fifteenth St., two-st'y store, 18′ x 52′; A. B. Levis, contractor.

Hancock St., s of Norris St., 2 two-st'y dwells., 14′ x 40′; A. M. Hoffman, contractor.

Fourth St., n of Somerset St., three-st'y factory, 32′ x 72′; Albert E. Rau, contractor.

Portland, Oregon.

Labor.—Skilled mechanics are all employed at good wages, and at times bricklayers have been in demand, but of late contractors have not had any trouble securing all the men necessary.

Alteration.—R. R. Thompson is having a third-st'y put on the large brick building, occupied by Hawley, Dodd & Co., hardware dealers; size of building, 50′ x 165′, and facing on three streets; cost of improvements about $15,000; F. W. Lewis, contractor; J. Krumbein, architect for above buildings.

Church.—Plans have been prepared for a Presbyterian Church, costing $4,500; Campbell, contractor.

Houses.—W. Lewis has the contract for 5 cottages for Mr. Corbet; cost, $3,500 each; W. H. Williams, architect.

Parsonage.—The German Methodist Evangelical Society have let the contract for a two-st'y frame parsonage to C. Gardner, at $4,300.

Stores.—C. De Burge & Malarkey are putting up a substantial three-st'y frame building, 50′ frontage for business purposes; cost, $7,500.

St. Louis.

Building Permits.—Famous Shoe & Clothing Co., brick addition; cost, $30,000; J. B. Legg, architect; sub-let.

Peter Oakes, brick dwell.; cost, $4,870; Cameron, architect; C. Linnenkohl, contractor.

Mrs. Martha McNeil, 3 adjacent brick tenements; cost, $6,980; C. Mensinier, architect; C. Linnenkohl, contractor.

I. N. Miller, brick dwell.; cost, $3,500; Mathenes, architect.

David Davis, 3 adjacent dwells.; cost, $5,500; T. S. Argust, architect; David Davis, contractor.

Mrs. Julia Kessel, 3 adjacent dwells.; cost, $9,800; August Beinke, architect; Fred. Offerman, contractor.

Mathias Leopold, 3 adjacent dwells.; cost, $7,000: Woerver, architect; W. M. Riewe, contractor.

Michael Foley, brick dwell.; cost, $4,000; Flanery, architect; John Waters, contractor.

Paul Adam, brick dwell.; cost, $6,200; Jansen, architect; Fred. Offerman, contractor.

S. H. Hoffman, brick dwell.; cost, $6,000; S. H. Hoffman, architect and contractor.

Francis J. Bryan, 2 adjacent brick dwells.; cost, $10,000; Schaper, architect; F. W. Loffhagen, contractor.

Ellen Butler, brick dwell.; cost, $3,300; Jacob Robinson, contractor.

St. Louis Wooden Ware Works, brick wooden ware factory; cost, $7,500; sub-let.

Jacob Michel, brick dwell.; cost, $6,000; H. & S., architects; Herman Schumacher, contractor.

Mary E. Scanlan, brick dwell.; cost, $3,300; Erin, architect; J. H. Egstrat Morrison, contractor.

Washington, D. C.

Building Permits.—The following permits for new buildings worth $3,000 or over, have been issued since last report.

Three-st'y brick dwell., to be built on Sixth St., bet. E and F Sts., n w, for Christian Rupert; cost, $13,000; J. G. Myers, architect; A. Getz, builder.

Two-st'y brick dwell., to be built cor. of Sixth and M Sts., n w, for Wm. Fletcher; cost, $5,000; J. H. Howlett, builder.

Three-st'y brick dwell., to be built cor. of Seventeenth and N Sts., n w, for J. A. Ruff; cost, $7,000; Holtzclaw Bros., builders.

Two-st'y frame dwell., to be built in county for G. F. J. Coburn; cost, $6,000; F. G. Atchinson, architect; Cranford & Degger, builders.

2 three-st'y brick dwells., to be built on Twelfth St., bet. E and F Sts., n w, for M. William; cost, $10,750; C. A. Didden, architect.

Two-st'y brick dwell., to be built on L St., bet. Ninth and Tenth Sts., n w, for H. A. Bailey; cost, $3,000; E. S. Friedrich, architect.

4 three-st'y brick dwells., to be built on Nineteenth St., near S St., n w, for Mrs. P. W. Page; cost, $17,500; Gray & Page, architects; W. J. Kenderdine.

Three-st'y brick dwell., to be built on Twelfth St., near Mass. Ave., for Julius Schneider; cost, $6,100; J. H. Knapp, builder.

7 three-st'y brick dwells., to be built cor. P and Marion St., for W. Z. Partello; cost, $35,000.

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CONTENTS.

THE Philadelphia *Press* is kind enough to notice our comments upon the fact, made evident by the investigation now in progress at Washington, that the building business of the United States is too extensive to be carried on with economy by a central bureau, but interprets them as an opinion that abuses have in consequence crept into the administration of the office of the Government Architect. It is only fair to say that this interpretation is quite erroneous. Every one who is concerned with building will understand that while such an office may be administered with the most scrupulous integrity and economy, it must to a certain extent lack those opportunities for taking advantage of circumstances to save money or time which present themselves so often to the private architect; and with equal ability and good intention, the man who is obliged to carry in his mind the affairs of a hundred million dollars' worth of buildings at once can do each of them less justice than they would receive from separate persons, to whom they were matters of special solicitude. In saying this we only repeat the opinion of the last two Government Architects themselves, as expressed in their published reports; and we know of no persons better qualified to judge of the matter. The *Press* thinks that our suggestion, that public commissions should be awarded in this, as in all other civilized countries, to the architects who prove themselves most worthy of them, "opens up an unpleasant vista of favoritism and incompetence." We must confess that we do not see the connection between the two things. Why the system which gives to France at once a Garnier and a Grand Opéra, a Palais de Justice and Duc, the Halles Centrales and Baltard, to England Street and the Law Courts, Barry and the Palace of Westminster, and to Germany, Wallot and the Parliament House, should lead in this country only to "favoritism and incompetence," we cannot understand. Of course, with such struggles as are supposed to be attractive to architects in portions of the West and South nothing but incompetence will care to meddle; but a fair, open competition for a large Government building, with an expert jury to render the award, and the execution of the work at the proper commission for the first premium, would, we are sure, enlist the efforts of the best men in the profession; and it is not too much to say that the best men in the profession in the United States are capable, if not of surpassing their European rivals, at least of doing work which will honor their country as well as themselves.

AT the last Convention of the American Institute of Architects a committee was appointed "to consider the matter of enlarging the number of Fellows of the Institute to a greater number than seventy, and to prepare amendments to the By-laws, to be submitted to the next convention for consideration." The committee has done its duty faithfully, and has prepared a draft of several important amendments to the present By-laws, which has been printed, and is to be considered by the Institute at the convention in Providence this month. Without intruding our opinion upon points which the Institute itself has not yet had the opportunity of discussing, we may without indiscretion mention the important features of the proposed amendments, as having a considerable interest for all architects. The most important change proposed by the committee is one which abolishes all restriction upon the number of Fellows of the Institute, restoring the regulations for admission to that grade substantially to the old form. The form of admission of Associates, however, the committee proposes to assimilate to that for Fellows, requiring candidates for the lower grade to be nominated by two Fellows, and elected by the Board of Trustees, the only difference, apparently, in the process being that the character of candidates for Fellowship is to be officially investigated, and that a three-fifths vote of the Trustees is requisite for an election; while Associates are allowed to enter without either of these restrictions. The old rule, by which all full members of Chapters are, *ipso facto*, Associates of the Institute, the committee proposes to abolish, completing in this way that divorce of the Institute from the Chapters which was begun three years ago.

THE committee suggests that the formation of Chapters of the Institute should be facilitated by permitting associations of architects containing only one Fellow of the Institute to apply for official recognition, instead of requiring three Fellows as the nucleus of the new Chapter, which is the present rule, and explains that the main object of the amendments which it proposes is to assist the Institute "to increase the number of its Fellows so that it shall embrace a large majority of the able and honorable members of the profession who have been long enough in practice to have made a record for themselves;" adding further, that in providing for the continuance of the present rules, which require that members of the Institute shall be notified of the candidacy of applicants for Fellowship, and impose upon them the duty of interposing objections to the admission of men whom they know to be incompetent or unworthy, everthing possible seems to be done to guard the interests of the profession, "as there is no way, as in medicine and law, by which to give a legal professional standing to architects, to distinguish them from quacks and charlatans." The committee probably means that there is, in its opinion, no practical way of accomplishing here the object which it mentions, but, as a mere matter of fact, there is now in force in England a system which, by requiring all candidates for admission to the grade of Associate of the Royal Institute of British Architects to pass a thorough examination, confers upon those who attain that rank a professional standing quite as well defined as that of graduates in medicine, and much more so than that of lawyers, either in England or in this country.

THE subject of diminishing the risk from fire in the business portion of New York seems to have seriously engaged the attention of insurance companies, and a committee, appointed some time ago by the underwriters to confer with merchants, has just offered a series of recommendations of great interest. The most important matter brought up was that of an additional supply of water for extinguishing fires, and the committee advised the adoption of an official endorsement of a scheme which has been somewhat discussed, for bringing water from the Ramapo River in New Jersey in pipes across the Hudson to supply the lower part of the city. In regard to the construction of buildings it was recommended that rates of premium should be increased on all goods stored in buildings more than sixty-five feet in height, unless absolutely fire-proof; that a reduction of five cents in rates should be made for buildings fitted throughout with automatic fire-alarms; that a reduction should be made for buildings having perforated sprinkler-pipes in the sub-cellars and basements; that elevator-wells should be required to be enclosed by brick walls, and that an addition of ten cents to premium rates should be made on buildings situated in streets less than forty feet wide. To this latter suggestion the committee added another recommendation, that

buildings situated in streets less than forty feet wide should be provided with iron shutters to all the front windows. At present the law of New York requires that all openings whatever above the first story in stores and storehouses shall have iron shutters, which must always be closed at night; but the practice has always been to exempt the front windows above the first story, and it would be no easy matter to fit the large windows on the street front of a modern store with shutters. In fact, there is serious reason to doubt the policy of doing so, even if there were no trouble about it. The statute requires that all shutters on street fronts shall be so constructed that they can be opened and closed from the outside as well as the inside; but even with this precaution, the difficulty of detecting and reaching a conflagration so enclosed would, we think, in the opinion of an experienced engineer, go far to counterbalance the benefit which would result from the protection against heat from fires outside. Nothing seems to have been said about stand-pipes, and we trust that the singular resolution passed some time ago, by which the allowance previously made for this invaluable protection was, owing to the finding of a few pipes out of order, entirely withdrawn, has been rescinded; but the conviction left upon our mind by the proceedings is that the underwriters' committee has still much to learn about fire-resisting construction; and that consultation with a good architect, or still better, the observation of a series of practical tests, such as the Boston architects tried in vain, two years ago, to get the underwriters to coöperate with them in making, would not only materially hasten the process of preparing practicable and efficient rules, but would put the committee in possession of knowledge whose value to the insurance interest would be incalculable.

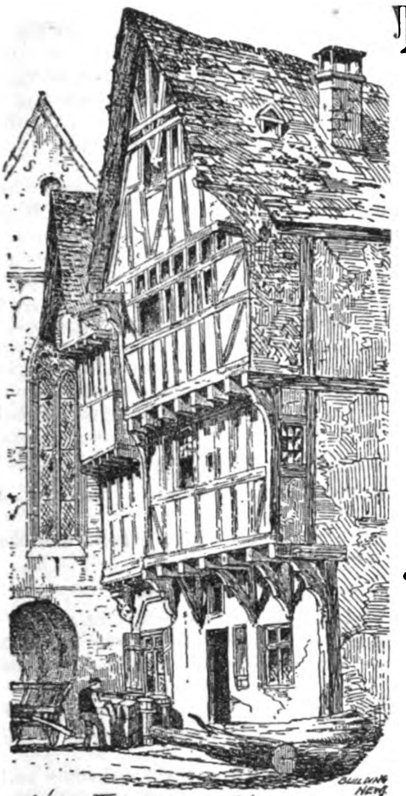
WE have been favored with a copy of one of the most remarkable "invitations to architects" which has yet come under our notice, and take a certain satisfaction in giving it currency. The building to which the attention of the profession is directed is intended for the use of a cotton exchange, and the competitors are required to furnish plans, elevations, sections, diagrams of construction, full and accurate descriptions, and "full detailed bona-fide estimates" of the cost of construction of their designs. The time for submitting drawings is fixed on the first of September next. The circulars have no date, but unless our invitation was unduly belated we are forced to conclude that the competitors generally are expected to go through with the labors specified in about thirty days. This, as we need not tell those who know anything of office business, would involve very lively work on the part of an architect and his assistants, and one would suppose that a committee in such a hurry would expect to pay liberally for compliance with their wishes; so that it is with some surprise that we read a sentence near the end of the circular, announcing that "no premium is offered to competitors," and a careful search through the whole document fails to reveal any promise or suggestion whatever that those who accept this extraordinary invitation will be regarded or treated otherwise than as simple gudgeons, who do not know enough to see whether there is any bait on the hook before biting at it.

AN experienced eye will be caught by another curious circumstance in the wording of the circular. In mentioning the details of the accommodation required in the building, the sizes of the rooms to be provided for are specified with a startling exactness. We read, for instance, that the basement "is to contain a restaurant of about thirty-nine by sixty-five feet, with a room which may be used for kitchen or office; an office which may be either adapted for banking or insurance business, of about twenty-six by sixty-six feet; an office of about twenty-six by thirty-nine feet," and so on; while the story above is parcelled out with similar minuteness. By applying to these peculiar features of the invitation that Socratic questioning which is so dear to the mind no longer subject to the illusions of youth, we may perhaps convey a useful lesson to some of our readers. "How does it happen," we should first ask, "that the desirable height, width and breadth of all the principal rooms in the building have fixed themselves with such exactness in the minds of the committee?" "Evidently," we will suppose Alcibiades to answer, "because the dimensions were measured from some plan." "But if the committee has a plan already made which it thinks well of, why does it send around to architects inviting them to 'compete' in sending more plans?" "Perhaps because it thinks it might be useful to collect the ideas of other people on the subject." "Judging from all the indications, what benefit seems likely to accrue to the innocent persons disposed to exhaust themselves in efforts to furnish these ideas?" We listen in vain for a reply. "What degree of intelligence, then, is to be attributed to those persons, if any, not concerned in the drawings which have obviously been already prepared, who may respond to the committee's invitation?" We leave this question for our readers to answer.

WE have had to say so much of late about the degrading and ludicrous proposals by which certain public functionaries have thought to "invite" the architectural profession to scramble for their little favors, that we are glad to have an opportunity for calling attention to the way in which the laws of civilized countries view the rights of those architects who compete for work in good faith. The authorities of a certain town in France, desiring to build a school-house, advertised, as is customary there, for competitive designs, promising, as is also customary abroad, that the execution of the work, at the usual commission, should be confided to the author of the design placed first by the judges. The highest award fell to an architect of some distinction, M. Bunot, who proceeded, in accordance with the stipulations of the programme, to prepare the working drawings. At this juncture another official, the director of primary instruction, made his appearance, and suggested changes in the plans, which seemed to the architect injudicious, and he objected, naturally expecting that some consideration would be given to his opinion, and that if overruled, it would be by the proper authority. The whole proceeding seems, however, to have been concocted, or at least seized upon as a pretext, by the sagacious village authorities, for getting M. Bunot out of the way, and he was promptly notified of his dismissal, on account of his "refusal to modify the original plan;" and a local surveyor was appointed in his place. M. Bunot, being of an independent character, declined to submit to such treatment, and brought a suit against the town, which was decided entirely in his favor. The court held that the objection of the architect to a change in the plans not formally ordered by the municipal council could not be interpreted as a refusal to make modifications; and that even if he had made such a refusal, the town could not for that reason break its contract with him except through a judicial hearing and decision; declaring further that the unjustifiable dismissal of an architect selected in competition entitled him to recover, as indemnity for the advantages of which he had been wrongfully deprived, the whole commission which he would have had a right to claim if he had directed the construction to its entire completion; and ordering that M. Bunot should be awarded the usual percentage on the total cost of the works to be carried out, deducting only the actual expenses which he would have incurred in superintending them.

ANOTHER illustration of the mode of conducting competitions among people who respect themselves is to be found in the account of two which have just been decided in Paris. As our readers will remember, the City of Paris voted some time ago to set up a statue of Etienne Marcel near the new Hôtel de Ville; and another, of the great republican lawyer, Ledru-Rollin, in some other public place. To secure a choice among sculptors for these important works, competitions were announced, the highest premium in each case being the execution of the statue at the usual remuneration, while prizes in money were offered to the second and third in merit. This, we need not say, is the universal rule of competitions in Europe, where such trials are looked upon as devices for obtaining, at an increased expense, the advantage of several designs for any proposed work, instead of one; and the best artists entered the lists. For the Marcel statue the model of M. Idrac was judged the best, and will be carried into execution. M. Frémiet received one thousand dollars for his model as the second in merit; and M. Marqueste eight hundred for his, as the third. The Ledru-Rollin statue seems to be considered a less important work, as the premiums are smaller, and the names of the competitors are of less note than in the other. For this, M. Steiner receives the highest award, and the execution of the work; M. Eugène Laurent is classed second, and M. Capellaro third, with premiums of two hundred and one hundred and eighty dollars respectively.

BUILDERS' SCAFFOLDING.[1] — XIII.



HALF TIMBERED HOUSES- BACHARACH PRUSSIA·

THE mechanical principles involved in the laws of the phenomena resulting from the action of physical agencies are the basis of mechanical science. Mechanical forces are distinguished in their nature of production from physical and chemical forces; these latter may produce mechanical effects. It may be premised that unless otherwise indicated, the action of forces will, for the present, for simplicity be confined to a very small body called a particle, and hence the forces will be conceived to act at a single point occupied by the particle, so that the lines of their action will intersect each other in this point. It will be essentially the same if we conceive of force acting on large bodies that it is imparted in directions passing through the centre of gravity, without any tendency to revolve or upset it; but merely to move, press, or pull it.

20. The forces considered in mechanics produce or oppose motion, rest, or change of position of bodies. If the opposing forces are equal, they or the body on which they mutually act are in equilibrium; *i. e.* a balance of opposing forces is established between them.

21. The most potent extraneous forces which we shall have to consider are the nature of *weight*, or gravity, and *momentum*, *i. e.*, weight in a state of motion, or the mechanical effect produced by the weight of a body and the motion imparted to it by force combined.

22. It is convenient in considering the abstract mechanical effect of force on entire bodies, to assume that the body is perfectly hard, impenetrable, rigid; one that does not break, stretch, bend, contract, or otherwise change its shape, and is merely acted upon by the particular extraneous force or forces under consideration and none other; so that the mind need not be perplexed by considering the modifying effect of friction, gravity, — when the active force is other than gravity, — or other extraneous influences, which are reserved to be considered separately under their proper heading. We have only to bear in mind that all that is effected by the extraneous force is to produce motion of the body as a whole; or to strain it with tension, compression, shearing tension, etc.; or to bring it to rest, or keep it at rest, according as the force or dominant remainder of a force which is unexpended in opposing another force assumes or produces any of these states. The body is merely to be considered as the material instrument upon which the force under discussion acts. By observing this process of *isolation*, in reasoning concerning forces, the mind is not at the same instant confused with considering the various physical properties and qualities otherwise inseparable from materials, and which naturally suggest themselves to the observation, but which are more readily considered separately, under "strength of materials," "friction," etc.; and hence, the present study will be much clearer and direct by divesting the word *body* of all these natural attributes which we find materials to possess.

23. Force is *potential* (latent) or *active*; it is a mechanical or physical principle which we can only recognize or measure by some of the physical effects which it produces on matter, considered as entire bodies, at rest, in motion, or strained; or varied combinations of these acting on any body. Force is co-existent with matter; we are not cognizant of force without the interposition of matter, yet matter is not force; it *resides* in a body, latent until called into action by an active extraneous force in physical operation. Force must be resisted by force or a resultant, if more than one force opposes it, in an opposite direction in the same plane of action. Motion produced by a single force acts in a straight line.

24. We shall have to consider the mechanical action of force as applied to rigid bodies derived from weight, gravitative acceleration, momentum, impact, impulse, shock, vibration, or from whatever source they may occur.

25. Amongst the immediate effects produced by force on rigid bodies are the deranging, separating, or compressing of the particles of matter, the fibres, etc., composing the materials of a body, in consequence of which we have to consider the force as acting against the natural inherent forces or resistance, *i. e.*, the *strength of the materials* composing the body.

26. In an analysis of the effects of force, regard must be paid to: (*a*) The quantity or intensity, (*b*) the direction[2] of its action, (*c*) the part of a body to which it is applied, called *the point of application.*

When extraneous force is applied to a body at rest, it imparts[3] force to that body, and if the latent force in or belonging to the latter body is less, motion will be produced; if greater, it will remain at rest, and *strain*[4] will be produced amongst the particles of matter of which the body is composed, in which state it is said to *tend* to produce motion; or if the body were in a state of motion, and mechanical force were applied to arrest or prevent it, and the body still moved, it would produce strain and *tend* to produce rest in the moving body. The element of friction, which is considered as a force, invariably tends to destroy or absolutely prevents motion, but does not produce or tend to produce motion; and hence for distinction is considered separately.

27. A single force can produce motion; but strain requires the presence of at least two opposing forces acting the one against the other, which may be either equal forces or equal portions of unequal forces acting in opposite directions. If a body simply bears or presses upon another, or is suspended from it, it produces simply strain; but in the first instance it is strain pressure, and in the second tension.

28. Force that is expended partly in producing strain and partly in producing motion is called a *working*[5] *force,* as it performs a certain amount of mechanical work.

29. These different mechanical effects produced by force are not different kinds of force, but merely the action and reaction of the same force, acting in opposing directions.

30. When once a force is imparted to a body it would move continually in a straight line in the direction in which it was imparted, and at a uniform velocity, if not restrained or retarded by other force. In practice these retarding forces are gravity, friction of surfaces in contact, etc. Force imparted to a body in a direction passing through its centre of gravity moves or strains it without rotating or upsetting it, or occasioning a tendency thereto; but if it be applied on one side of the centre of gravity, it will tend to rotate or upset it, or absolutely do so, according to its leverage intensity with relation to the resisting force, or elements of stability of the body. Force is assumed to be applied to the rigid body at right angles to its surface at the point of application, in order to impart its full effect. If it be applied obliquely to the surface only a portion of the force is imparted or enters the body, and is in direct proportion to its angle of incidence.

31. If two forces act upon a point in the same line of action their combined effect will be equal to the sum or difference of the effects of the forces acting separately, according as they tend to draw the point in the same or opposite directions.

32. Forces may act in the same or in different planes upon a body: a plane of action may be represented by a flat board in any position, upon which lines are drawn to represent certain directions of forces which would thus be in the same plane; but if two such boards, each having lines to represent the lines of action of certain groups of forces, all in the direction of the same point, be inclined together at right angles, or obliquely or diagonally to each other, the forces represented by the lines on each lie in the respective planes thus relatively represented. Forces in different planes may tend towards each other, and yet never meet or intersect, notwithstanding that the planes in which they respectively act are inclined towards each other; while they would intersect if conceived to be extensible. Forces in different planes may converge towards, or diverge away from, the same point, but cannot be adequately represented together on a flat surface.

33. **Impulse** is sudden impact, blow or collision of a body in motion against another body at rest, or moving in a different direction, or in the same direction at a less velocity. If the force which was in action in moving the body, is in whole or in part suddenly arrested, and converted from motion into *strain*, it is the same

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[1] Continued from page 317, No. 393.

[2] *Direction* of a force is the line in which it tends to produce motion. The force may be conceived to act at any point in this line, and the effect is the same whether in producing pressure or motion. A straight line drawn through the point of application of a single force, along its direction, is the *line of action* of that force.

[3] "*Imparted*" must not be confounded with "*applied*," as they are distinct conditions. Force may be *applied* to a body in any direction, but can be *imparted* only perpendicular to the plane of the portion of surface of the body, at the point of application. The scientific *point* may in practice become an area of varied extent, according as the parts of bodies in contact are flat, round, pointed, or of irregular form.

[4] *Strain* is a mechanical change of form, produced by the action of a load or stress equal forces or equal portions of unequal forces acting in opposite directions, either as pushing, pulling, twisting against each other, and may take place either in rest or in motion. *Stress* is strength or molecular force acting within the materials which bring into action their elastic and cohesive properties, by means of the application of external forces, and resists deformation. *Note.*—This distinction is not always observed, the terms being sometimes used indiscriminately. In most materials the *stresses* are sensibly proportional to the *strains* so long as no permanent *set* is produced. If the straining action produce permanent change of form, the *stresses* increase less rapidly than the *strains*, a limit more or less clearly marked in different materials; when *stress* ceases to be proportional to *strain*, the elastic strength of the materials is reached, and should not be exceeded in any structure.

[5] *Work* is measured by *units*, just as length, weight, volume, and time are measured. Thus, to raise one pound one foot high vertically against the force of gravity at the earth's surface is a unit of work. Two pounds raised one foot high, or one pound raised two feet high, equal two units. A unit of work may be with or without reference to a unit of time; 33,000 units of work performed in a unit of time, *i. e.*, 33,000 pounds raised one foot high in a minute, are equal to one *horse-power*. As mechanical resistances and pressures of every kind may be expressed in pounds' weight, the above elementary unit can be used to measure every kind of work.

force producing a different effect, which ultimate effect cannot be measured by a numerically equivalent amount of mere static pressure, dead-weight, or pull, by the ordinary system of units. This problem is at present only capable of assigning what is erroneously deemed by some an equivalent momentum, or impetus, *i. e.*, a quantity of motion acquired by a body, derived from its weight, multiplied into its velocity of motion, and expressed in foot-pounds, foot-tons, etc., per second of time in which the translation of a body is performed according to certain units of weight and space described in units of time. Bodies having equal momentums or moving force will strike equally hard against each other; but just with what mechanical effect expressed in units of dead weight cannot be estimated by any general formula, *i. e.*, the intensity of impact producing equivalent effect to a dead pressure is an incommensurable quantity. Sufficient experiments have been made from time to time to disprove the popular theory of such an equivalence.

34. Momentum or moving force is the quantity of force accumulated in a moving body, and is measured in foot-pounds, or foot-tons, performed per *second* or unit of time. It is derived from the weight of the body in pounds or tons, multiplied into its rate of velocity in feet per second, and hence the momentum force of a small body or weight having a swift[1] velocity may be equal to that of a large body having a correspondingly slow velocity.

35. *Moving* a body and *lifting* it must not be regarded as interchangeable terms for the same effect, though they are sometimes confounded. The least force if unrestrained by other force may *move* the largest body; but the effort of *lifting* is resisted to the full intensity of the action of the weight or gravitative force of the body. Thus a small power only is required to move a body down an inclined plane, if the surface be of a glassy nature, relatively to that required to push it up the incline; or in a still greater degree to that required to *lift* it up bodily.

36. The investigation of strains in trussed or frame structures of all kinds may be considered as based on the following fundamental laws of mechanics, which must be intelligently understood in order to thoroughly comprehend the subject; in fact without knowing them it is impossible to understand intelligently and certainly whether any design or frame possesses the requisite strength, stiffness, or stability to answer its intended purpose.

37. These laws are: (*a*) The composition and resolution of forces; (*b*) The laws of leverage; (*c*) The equality of moments.

38. [As the force of gravity is very nearly constant and always in action, it is a convenient measure of the magnitude or intensity of force; hence, the number of unit-weights which it will counterbalance has been adopted.]

39. *The Composition and Resolution of Forces.* — Force is either single in action, or may be combined in simultaneous action according to certain laws. The direction as well as the magnitude of a force regulates its mechanical effect. The *composition* of forces consists in the method of finding a single force called the *resultant*, whose mechanical effect in quantity and direction is equivalent to two or more single forces of given magnitudes and directions, called its *components*. If the resultant acted in an opposite direction, it would keep in equilibrium the body on which they mutually act through its centre of gravity. The resultant tending towards the same point might be substituted for its component forces with the same effect.

40. A heavy body exerts a vertical downward force equal to its weight, and will descend in a vertical line, if not otherwise influenced by some other force; and its force is always the same as if it were collected in, and acted along that line.

41. But if weight is sustained by two inclined meeting-beams bracing each other rafter-like, as in Figure 34, its effect on these depends on their respective inclinations with relation to the vertical line of gravity; the greater the inclination the greater is the straining effect. The weight thus resolves itself into two forces, one passing through each beam. But it is evident that a vertical *post*, to take the position occupied by the king-bolt, may sustain the weight, in which case the sustaining force is equal to the weight; hence, it is more economical to use a single force than two component forces, for their sum will always be greater than their resultant.

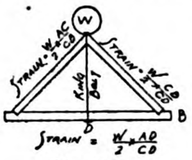


Fig. 34.

42. This form of arrangement in an inverted position, *i. e.*, a horizontal beam, a vertical strut, and two oblique tension-rods constitutes a trussed girder, and is the simplest form of truss. The duty of the different corresponding members in the *inverted* form, and consequently the character of the strains which they resist are reversed; the oblique members being in tension, while the vertical and horizontal pieces are in compression. This arrangement embodies the principle of what is known as the "Fink Truss" (alluded to in February paper, page 56), a simple form of which is shown in Figure 35, the outline of which, *i. e.*, the horizontal beam, the vertical strut in the centre, and the two oblique tension-rods extending from the foot of the stay to the ends of the beam, form the *primary* truss, the two smaller trusses of similar form on each side of the centre are called *secondary* trusses. For the present we shall confine our attention to the *primary* truss. We will suppose a load to be placed on the centre of the beam, its whole weight acting vertically in the direction of gravitation upon the vertical strut in the centre of the beam. As the two abutments sustain the whole load equally between them, it follows that the whole weight is transmitted by the tension-rods — one-half of it by each — from the lower end of the strut to the abutments; hence, the strain on each tension-rod is due to half the central load.[2] We are aware then of the strains produced *directly* at three points, the two abutments and the centre stay being equal to, or expressed by the exact weight of the load, or its direct proportions, *i. e.*, the whole weight on the vertical strut at the centre and half the weight on each abutment; but as the tension-rods do not receive the load *directly*, *i. e.*, in the vertical line of the action of the load as the other parts do, an augmented strain is the result. To find how much the strain is augmented above the direct proportions of the load which the rods receive from the foot of the stay, which must exert the same pressure as the weight upon its head, there is a simple rule: — Call the tension-rod the oblique, and the stay the vertical, to briefly indicate the geometrical relation of these parts for the purpose of expression in formula.

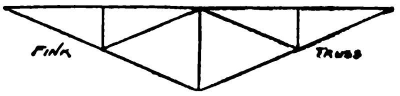


Fig. 35.

$$\text{The strain on the inclined tension-rod} = \frac{\text{Load in lbs.} \times \text{Length of Oblique}}{\text{Length of Vertical.}}$$

[As we proceed we will indicate other methods for obtaining this result.]

Example: — Suppose the length of *vertical* to be 5 feet,[3] and the *oblique* 14 feet, and the load 1,000 lbs. Then

$$\text{Strain on oblique} = \frac{1{,}000 \text{ lbs.} \times 10}{5} = 2{,}000 \text{ lbs.}$$

Thus we find that a load of 1,000 lbs. on the centre of the *primary* truss[4] produces a strain on the tension-rods of 2,000 lbs., just the same as if 2,000 lbs. were actually suspended from each rod placed in a vertical position; hence not only the section of the rods, but their joints and connections, *i. e.*, the eyes, pins, etc., with the other members of the primary truss, must be proportioned to safely sustain this augmented strain.

43. This principle is often useful for strengthening beams and girders for various purposes: as for trussing overhead travelling cranes and to support floors, platforms, walls, etc., and under certain circumstances is adaptable for repairing broken, or strengthening weak beams or ledgers, of long span (when scantlings of sufficient section are not at hand to replace them). Figure 36 shows such a case, but it must be observed that mere nailing or spiking of the tension pieces to the other parts is not to be trusted: bolts should be used.

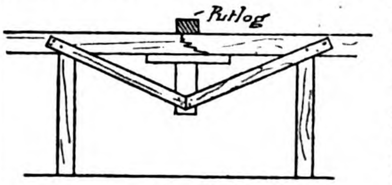
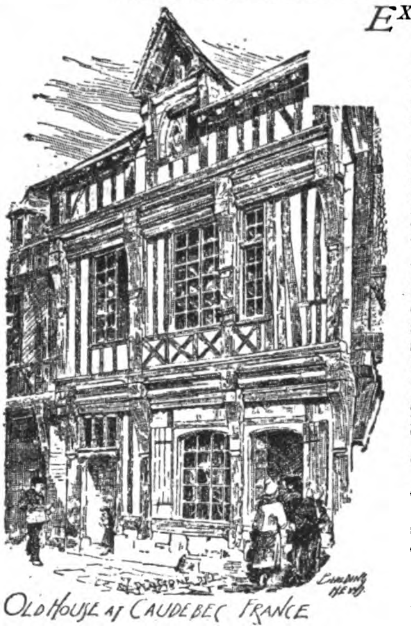


Fig. 36.

THE $3,000-HOUSE COMPETITION. — XVI.

SPECIFICATIONS SUBMITTED BY "*Pencillaria.*"



Excavation: — The cellar is to be excavated to a clear depth of 7′ 6″ below the underside of first-floor joist. Trenches for all foundations to be dug at least 6″ below the cellar bottom.

Drains: — All drain-pipe to be of best 6″ Portland cement, to be properly trapped, graded, and the joints cemented tight with Portland cement.

Foundations: — Walls to be not less than 18″ thick; all laid in water-lime mortar, composed of one part lime, and three parts coarse sharp sand, well-filled and flushed upon both sides. The stonework to extend 6″ above grade-line and levelled off for brick and underpinning. The same to be 5′ high all around.

Cut-Stone for cellar window-sills, six in all, to be provided, also one cellar door-sill, to be of a good quality of cut-stone.

Brickwork: — The entire underpinning to be of brick, 3′ high, and 12″ thick, and all brickwork to be of well-burned, hard brick. Cellar piers to be 12″ x 12″. Chimneys as shown, and all flues to be well-plastered

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[1] The penetrative effect of bodies of different densities at high velocities, having equal momentums, is not here considered in a practical sense, nor the varying resistance offered by the air to bodies moving in it at different velocities: these must be considered separately.

[2] In this analysis we have, in order to avoid unnecessary complexity, assumed that the beam exercises no transverse resistance to the weight of the load which would assist to carry it, and thereby lessen the full strain on the tension-rods due to the load.

[3] In measuring the length of frame pieces for strains, it must be taken along their centre lines, and only measured between the intersecting points of these centre lines.

[4] *Truss* is a framed girder, or framework structure, employed to transfer its own and any imposed weight to its supports, called its abutments (and pier when it supports the adjacent ends of two contiguous trusses), the longitudinal parts being related by braces and ties, to prevent distortion under the action of external forces, and whose members are subject only to two kinds of strain — tension and compression.

on the inside. Furnace flue, 8" x 8", to be carried up straight all the way. The fireplace to have Philadelphia pressed-brick facings, fire-brick lining.

Lath and Plaster: — Pine laths, two-coat plaster.

Cellar Bottom: — Concrete cellar bottom and form gutters around the main walls sufficient to carry all the water to a drain. Place an iron hopper and strainer over the mouth of drain.

Cistern: — The cistern to be 6' in diameter, and 6' deep with an 8"-inch hard brick wall laid up with best water-lime mortar, and thoroughly plastered on inside.

CARPENTER-WORK.

Timber and Framing: — First-floor joists, 2" x 10", 16" on centres; second-floor joists, 2" x 10", 16" on centres; attic joists, 2" x 10", 16" on centres; ceiling joists, 2" x 8", 16" on centres; rafters, 2" x 6", 20" on centres; hips, 2" x 10"; partitions, 2" x 4", 16" on centres; bearing partitions, 3" x 4", 12" on centres; door studs, 2" x 4", double; plates, 2" x 4", double; bridging 2" x 2"; girders, 6" x 10"; sills, 6" x 10"; girths, 4" x 4"; posts, 4" x 6".

All timber to be of good sound hemlock. All floors to be cross-bridged every 7'.

Hot-Air Pipes: — Furnish double tin hot-air pipes in partitions, where required.

Lumber: — The lumber to be of white-pine unless otherwise specified.

Sheathing: — Sheathe on the outside with sound matched ⅞" hemlock boards, not to exceed 8" in width.

Exterior Finish: — All exterior finish to be of clear white-pine, well seasoned, and primed as soon as put up. The first story to be covered with feather-edge clapboards, 4" face, and the second story *shingled* as shown.

Roofs: — Roofs to be covered with good sound hemlock boards, of even thickness.

Shingles: — All roofs to be covered with the best quality of sawed pine shingles, laid 5½" to the weather.

Floors: — Under floors to be hemlock. Upper floor in first story to be ⅞" yellow pine or (Norway) pine of best quality stock, tongued and grooved, 3" in width. The second floor and attic floor to be of a good quality of stock, not over 6" wide, tongued and grooved, and blind-nailed. The porch floors to be 1¼" and 3" in width.

Doors: — All doors to be No. 1 quality mill doors. The sliding doors to be 1⅜" thick; eight panels to each door. Principal doors to be 1⅜" thick. Closet doors to be 1¼" thick, all four-panel.

Door and Window Trimmings: — The sliding doors to be hung on Warner's sheaves, with locks and flush furniture. The front doors to be hung on 4½" x 4½" acorn-tipped amber bronze butts, three to each door. All other doors to be hung on 4" x 4" cast-iron butts, three to all the largest doors.

Locks: — All principal doors to have mortice-locks. Front door to have a 6" heavy front door lock, with two keys. Also a bronze knob and fittings. All other doors to have hemacite knobs, roses, etc. Cellar doors to have strong wrought-iron hinges. All window-blinds to be hung on 4" amber-bronze "Parliament" butts, and trimmed with shutter-bars of same material. All other hardware trimmings to be furnished and put on, for pantries, closets, drawers, etc. Double wardrobe hooks in all closets.

Windows: — Sashes to be 1¼" thick, of clear white-pine, double hung.

Glass: — All windows to be glazed with best double-thick American window-glass. The cellar windows to have single-thick American glass. The stained-glass in window-heads and staircase window to cost not to exceed 50 c. per foot.

Blinds: — All windows to have inside blinds in two folds, with rolling slats.

Interior Finish: — All inside finish to be with sound, clear, kiln-dried white-pine, unless otherwise specified. Bases in all rooms not wainscoted.

Mantels and shelves: — One mantel in living-room, to cost $10; also three shelves where required, to cost $5 each.

Stairs: — The main staircase to have 1" risers, and 1¼" treads with moulding under. Newels and rails to be of best cherry; balusters and all other parts to be of white-pine.

Kitchen Pantry to have counter shelf, and five shelves on each side; two cupboards under counter shelf. Shelves to be closed on one side with panel doors, and to have eight drawers under.

Wainscoting: — Wainscot walls of the kitchen and bath-room 3' high all around.

Bath-room: — Bath-tub to be cased.

Tinning: — The gutters to be properly lined with best M. F. tin, and run the tin up under the shingles at least 6", bring the tin over the face of the cornice and tack it down smoothly. All angles, valleys, and other necessary places to be covered with tin as above, all well soldered in rosin and made perfectly water-tight. Leaders to be put up where necessary, of galvanized-iron, 4" calibre, well and thoroughly secured.

Gas-Pipe: — The gas-pipes to be put in according to the local regulations for all required fixture connections.

Painting: — The exterior to have three good coats. All tin and galvanized-iron work to have two good coats of iron ore and oil. Paint roofs with two good coats of same.

The first floor to be finished with three good coats of best natural wood-finish, rubbed down. This includes the floors. The second story to be painted with three good coats.

PLUMBING.

Boiler: — Furnish and set in kitchen one 30-gallon, heavy pressure, copper boiler, properly connected to range and city water.

Bath-tub: — 12-oz. bath-tub complete, to be supplied with hot and cold city water.

Water-Closet: — Set one Philadelphia hopper-closet in privy properly trapped and connected by a 4" boiler pipe to sewer. ⅝" cold-water supply.

Sink: — 18" x 30" cast-iron sink and No. 2 pitcher pump properly connected and trapped. Trap all waste-pipes with Adee patent trap.

TENDERS TO BUILD.

SYRACUSE, N. Y., December 12, 1882.

"*Pencillaria:*"

I will furnish and set in your house one 30-gall. heavy pressure, copper boiler, properly connected to range and city water. Set one 12-oz., bath-tub with plugs and chain, 1¼" waste-pipe and a double bath-cock and sprinkler to be supplied with hot and cold city water. Set one Philadelphia hopper-closet and trap with a 4-inch cast-iron soil-pipe to sewers and ⅝" cold-water supply. Set one 18" x 30" cast-iron sink, and No. 2 pitcher-spout pump with 1" suction and 1¼" discharge pipe, all to be properly trapped. Well trap all waste-pipe with Adee patent trap and do the work workmanlike for ninety-five dollars ($95.00).

EDWARD JOY.

SYRACUSE, N. Y., December 22, 1882.

I will build the cottage designed by "*Pencillaria*," according to these plans, for $3,169.40.

THOS. JACKSON.

DESIGN FOR COTTAGE SUBMITTED BY "*Pencillaria.*"

ESTIMATE.

Excavation, 200 yds., @ 20 c.	$40.00
Stone-work, 69 perch, @ $2.75	189.75
(Stone counted as 16½ cubic feet per perch, local custom.)	
Brickwork, 23 M. brick, @ $12	276.00
Plastering, 1,000 yds., @ 20 c.	200.00
Concrete cellar bottom	24.00
Philadelphia brick (fireplace)	12.00
Three terra-cotta panels	30.00
Portland cement drain-pipe	10.00
Total	$781.75

CARPENTER-WORK.

Hemlock, 11,500 ft., @ $22, worked		$253.00
1,000 sq. ft. flooring, @ $24, worked		24.00
1,000 sq. ft. yellow-pine, @ $44, worked		44.00
2,000 sq. ft. white-pine flooring, @ $34, worked		68.00
Windows.		
Outside casing, stock and labor	$ .50	
Inside casing, stock and labor	.80	
Jambs, with stops, etc.	1.00	
Sill, with mouldings	.32	
Sash	.72	
Glass	2.66	
Blinds	3.40	
Fitting sash and blinds	1.00	
Trimmings	.75	
Weights	.80	
Glazing	.90	
Twelve 4" x 4" colored lights, @ 5c	.60	
Total	$13.45	
25 windows, average price $13.45		336.25
6 cellar windows, @ $6 each		36.00
3 gable windows, @ $6 each		18.00
3 sliding doors, @ $25, complete		75.00
Doors.		
Architrave, stock and labor	$ 2.00	
Jamb " "	1.00	
Door	2.65	
Trimmings	.75	
Labor, hanging and trimming	.60	
Incidentals	1.00	
Total	$8.00	
24 doors, average price $8		192.00
Hall stairway		40.00
Kitchen stairs		12.00
Cellar stairs		5.00
Attic stairs		5.00
1,250 ft. siding, @ $40, worked		50.00
11,000 shingles, @ $7		77.00
1,300 shingles for roof, @ $7		91.00
800 ft. of baseboard, @ 5 c.		40.00
25 ft. wainscoting, @ 5 c.		12.50
Front porch		50.00
Side porch		38.00
Rear porch		38.00
Side balconies		72.00
Pantry		15.00
Fitting of rear water-closet		12.00
Cornice and gutter, 172 ft., @ 50 c.		86.00
3 gables, @ $20 each		60.00
Gas-pipes		38.00
Cellar doors		10.00
Cresting		8.00
Flashing, and galvanized-iron conductors		50.00
Mantel-piece		10.00
3 mantel shelves, @ $5		15.00
Water-table belt		35.00
Middle belt		35.00
Painting, complete		200.00
Plumbing		95.00
Architect's percentage		150.90
Total		$3,169.40

BILL OF DOORS AND WINDOWS.

First Story: — 1 front door, 4' x 8', eight panels, 1⅜" thick; 2 sliding doors, 3' 6" x 8', six panels, 1⅜" thick; 2 sliding doors, 3' x 8', six panels, 1⅜" thick; 1 sliding door, 5' x 8', eight-panel, 1⅜" thick; 8 doors, 2' 10" x 7' 4", four-panel, 1⅜" thick; 2 closet doors, 2' 8" x 7' 4", four-panel, 1¼" thick; 1 water-closet door, 2' 6" x 7", four-panel, 1¼" thick.

Second Floor: — 8 doors, 2' 8" x 7', four-panel, 1⅜" thick; 6 closet doors, 2' 6" x 7', four-panel, 1¼" thick.

Oriel Windows: — 3 windows with transom head-glass, 24" x 27", 2 lights pe casement; 3 transom lights, outside size of glass, 20" x 24".

Staircase Windows: — 2 windows with transom-heads, glass 26" x 30", two lights per casement, upper sash to be filled with 4" x 4" stained-glass transom; two casements, 26" x 26" glass, fitted with irregular pattern stained-glass.

First Story: — 9 windows, size of glass, 28" x 36", two lights to each casement; 12 4" x 4", stained-glass in upper sash.

Second Story: — 9 windows, size of glass 28" x 32", two lights to each casement; 12 4" x 4" stained-glass in upper sash.

THE ILLUSTRATIONS.

THE "BERKSHIRE," NEW YORK, N. Y. MR. CARL PFEIFFER, ARCHITECT, NEW YORK, N. Y.

THE co-operative apartment-house, which is to be known as the "Berkshire," and will cost $320,000, making the value of the property, including the land, $400,000, is to be built by the "Berkshire Apartment Association," a company organized by Mr. Pfeiffer, and incorporated under the laws of the State. There are eight shareholders in the association, Fletcher Harper, of the Harper Brothers, publishers, Treasurer. It is expected that each of the shareholders will occupy one of the apartments in the "Berkshire" when the building is completed, and this apartment will be his property permanently. The other apartments are to be rented out, and the stockholders will have a joint interest in the profits arising from this source, which will be realized in the form of regular dividends at stated intervals. The "Berkshire" will have a frontage of 76 feet on Madison Avenue, and a depth of 91 feet on Fifty-second Street. It will be nine stories high, with a basement and sub-cellar. The first story will be built of granite, and the upper stories of Croton pressed-brick, with stone, terra-cotta, and moulded brick ornamentations. The height of the building from the sidewalk to the roof

will be 122 feet, and the roof, which is to be flat, will be laid in tile-work, so as to form a promenade. The main entrance for the occupants of apartments will be on Madison Avenue. A separate entrance for servants and tradespeople will be constructed in the court-yard at the rear of the building. Inside the "Berkshire" will be cut up into seventeen apartments, two on each of the first seven floors, and three on the eighth floor. Each one of these apartments will consist of a library, a dining-room, a parlor, a kitchen, a bath-room, a laundry, a servants' room, abundance of closet room, and four bedrooms. The partitions are to be so arranged that they can be moved so as to meet the views of the occupants in regard to the size of any of these rooms, and each apartment is to have a second servants' room and a trunk room on the ninth floor, which is to be used as an attic for the convenience of tenants. On this floor, also, there is to be a steam drying-room. The kitchens of the apartments on the eighth floor will be in the attic. The rooms will all be finished in hard wood, and each apartment is liberally supplied with bay-windows, and balconies of iron and stone, which will serve to ornament the exterior of the building as well as for the convenience of the occupants. The upper sashes of the windows are to be of stained glass, and the lower, of the finest French-plate glass. The floor of the hallways and the landings of the stairs will be laid in tiles, and wherever the interior of the building can be tastefully ornamented it will be. A wide staircase is to lead from the main entrance to the different apartments on the upper floors. The supports of this will be of ornamented iron, the steps will be of white marble, and the railing of colored marble. A separate staircase for the servants and tradesmen will lead from the entrance in the court-yard. There will be two elevators, one for the use of the occupants of the apartments and the other for the servants, and the former will run to the roof of the house to accommodate gentlemen and ladies who wish to utilize the roof as a promenade. It is expected to light the building by gas, but the fixtures will be so constructed that as soon as any electric-light company locates a main near enough to be available electricity can be substituted for the gas. A portion of the basement will be set apart for the use of the janitor, and the two apartments on the first floor will have their kitchen and laundry here. The remainder of the basement is to be rented out for offices to physicians. The cellar is to be used for the engine and boiler rooms, and for the storage of coal. Here will be located an apparatus for cremating the refuse of the kitchen; this refuse being dried by steam, and then burned. The house is to be heated throughout by steam. For ventilation the same system will be used that has proved so successful in Dr. Hall's church, and the Roosevelt Hospital, both of which buildings were designed by Mr. Pfeiffer. It consists simply of a large fan in the basement, which forces the air over steam coils. The "Berkshire" will be made as thoroughly fire-proof as possible, and two iron staircases will run from the roof to the court-yard in the rear, connecting with each floor, for use in case of fire.

COMPETITIVE DESIGN FOR A $3,000-HOUSE SUBMITTED BY "*Pencillaria.*"

"'*Pencillaria's*' design is ingenious and attractive. By careful study he has turned an unpromising scheme into an excellent plan. Room is economized with great skill. An inherent fault lies in having to pass from kitchen to front hall through the dining and living room. The exterior could have been made attractive without the many breaks which now form a serious item of cost, and the outside chimney for the fireplace in the parlor alone is an expensive luxury. This want of self-denial prevents the design from taking rank beside those which have been made attractive by simpler means. The drawing is neat and crisp throughout, but in the detail of the fire-place there is evidently a slip which throws it out of true perspective." — *Extract from Jury's Report.*

HOUSE FOR GEORGE E. BOYDEN, ESQ., PROVIDENCE, R. I. MESSRS. W. R. WALKER & SON, ARCHITECTS, PROVIDENCE, R. I.

THE SIGMA PHI CHAPTER-HOUSE, WILLIAMSTOWN, MASS. MR. JAMES G. CUTLER, ARCHITECT, ROCHESTER, N. Y.

ADOPTED DESIGN OF MONUMENT FOR MONMOUTH BATTLE-FIELD, NEW JERSEY. ARCHITECTS, EMLEN T. LITTELL AND DOUGLAS SMYTH, NEW YORK; SCULPTOR, JAMES E. KELLY, NEW YORK.

The monument stands in a triangular lot and has a total height of ninety feet. The materials used are granite and bronze. In the base are set bronze medallions of prominent officers. The drum shows bas-reliefs in bronze of striking incidents of the battle. Bronze shields, bearing the coats of arms of the States whose colonial troops were present, festooned with laurel, rest on the upper weatherings. The remainder of the work, including the heroic-size statue of Liberty on the summit, is of granite. The appropriation, authorized by the State of New Jersey and the United States Government, is $40,000. The monument will be completed in 1884.

Preserving Iron from Rust. — The process of coating iron surfaces with fine metallic zinc mixed with oil and a drier and applied with a brush is recommended by *Engineering*. Two coats are said to be a secure protection against both the atmosphere and sea-water. A good mixture, of which only the necessary quantity ought to be prepared, consists of eight parts by weight of zinc, seventy-one of oil, and two of a siccative.

THE COMPETITION FOR A MECHANIC'S DOUBLE HOUSE.

FROM A HOUSE AT VIENNA, AUSTRIA

THE few designs — only five in all — submitted in the competition for a design for a double tenement cottage for two mechanics, the cost being limited to $3,000, made so little impression on our memories that after they had been sent down to our vaults their very existence was forgotten until one of the competitors reminded us that no announcement of the result of the competition had been made. For this negligence and forgetfulness on our part we desire to offer to the competitors our regretful apologies.

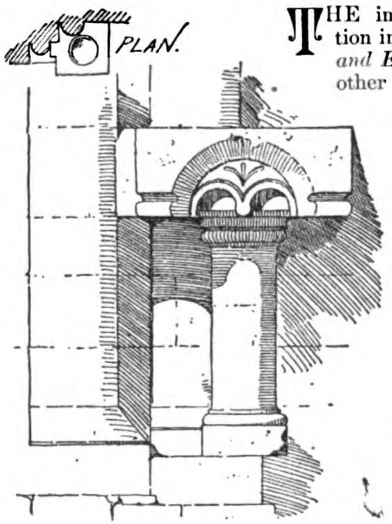
On examining the five designs we find that one of them, "*Family Broils's*," was received too late to be admitted to the competition, while the authors of the designs signed "*Great Expectations*" and "*Workmen*" failed to comply with the requirements of the programme in important particulars.

Thus the competition is restricted to the designs submitted by "*Artalie*" and "*Harrison*," and of these two "*Harrison*" alone has complied with all the conditions and has, moreover, succeeded in giving his design the character that one expects to find in a working-man's dwelling.

In view of these facts it has seemed to us that we should be doing no injustice to those who took part in the competition if we passed over the formality of submitting the drawings to a jury and settled the matter by awarding a second prize to the author of "*Harrison*," Mr. H. H. Atwood, of Boston, Mass.

Of the other designs we will merely add that next to "*Harrison's*" the design most in character is that of "*Workmen*," while the most attractive in design and the most ingenious in plan is that of "*Family Broils*," but we very much question whether a building of the size and architectural pretension of the one shown could be built, even in Denver, Colo., with a brick lower story for the sum named in the estimate.

A FEW WORDS ON FOUNDATIONS.



PISCINA — PRIORY OF ST GABRIEL CALVADOS. FRANCE. — REVUE GÉNÉRALE. XII

THE importance of a good foundation in building, says the *Building and Engineering Times*, as in most other things, will not, we presume, be disputed. A structure, like an argument in logic that is ill-founded, carries in it the germ of inevitable failure, if not of total annihilation. There is seldom great scope for choice in the selection of sites for building purposes, and a man takes a plot of ground as he takes a wife, for better or for worse. The nature of the subsoil in any district may generally be ascertained by inquiry with tolerable accuracy, but contingencies may often arise which will involve the builder in greater expense than he has reckoned upon. A loose bottom necessitates extra digging, or an influx of water involves a pumping and consequent delay. We have known contractors to be very hardly treated at times by architects in the matter of foundations. The modern iron-hearted practitioner, "conscientiously acting in the interests of his client," sternly declines to allow extras for unforeseen calamities such as the above, which ought, he thinks, to have been taken into account in tendering, while he as strictly insists upon exacting deductions for any unexpected advantages that may accrue to the builder — such, for example, as the fortunate discovery of sand on the site, which can be used for mortar.

The nature of the subsoil is best ascertained by sinking a well on the site. Clay is so liable to expansion and contraction from the alternate moisture and dryness of the weather, that it is no trustworthy bottom, and dry gravel is not only shifty, but subject to cavities which render it unreliable. In such cases an artificial foundation of concrete should be provided. Too much moisture may kill the lime in the concrete, and in some cases necessitate the use of an hydraulic lime. The mention of concrete leads us to reflect upon a popular superstition, which is very deep-rooted. It is generally assumed that in order

to secure a sound, compact bottom, the concrete ought to be thrown in from a staging at least six feet above the level of the trenches. This "long drop" is solemnly prescribed in specifications, and rigidly enforced in practice. We have known an architect insist on the resurrection of some twelve cubic yards of concrete which had been peacefully deposited in the trenches — *non requiescat in pace!* — because, forsooth, he declined to take the builder's word that it had been thrown in from a "proper height," and would not be content until he had seen the operation with his own eyes. To what purpose? If six feet is a good height, twelve feet would be a better, and so on, until — what would be the effect of dropping concrete into a trench from a balloon, say five hundred feet above the level of the ocean? Would not the mixture be a trifle scattered before it reached its destination? Throwing in concrete from a height is supposed to consolidate it, but does it really do so? If two bodies of unequal weight in proportion to their bulk be let fall from a height at the same time, the heavier body will reach the ground first, and the greater the height — that is, the longer they are exposed to the action of gravity — the greater will be the difference of time in which they will reach the ground. Now, the ballast or gravel which forms the principal ingredient in concrete, is just twice as heavy as the lime with which it is mixed, and it follows, therefore, that the greater the height of the staging from which concrete is thrown, the greater is the tendency to unmix it, by sending all the ballast to the bottom and all the lime to the top. Let there be no "long drop," then, but let the concrete be thoroughly mixed, wheeled in at a level, and well rammed.

Of all bottoms for building, perhaps a coarse, wet gravel is the best — a good, firm gravel that shows a clean and almost vertical side when cut into with the spade, and with such a bottom concrete is rarely required. Of clay we have already treated; but there is a kind of blue shale which forms an excellent foundation, so long as it is preserved from the action of the weather by a layer of concrete, but if left open to the atmosphere it will slake and become quite soft. Underground water-courses are occasionally to be met with, and are exceedingly dangerous to all foundations. Sometimes they can be conveyed away in drain-pipes, and occasionally it is necessary to arch over them; but it is never advisable to interrupt their course without providing some means of passage for them, as they are liable to unsettle the surrounding soil to an incalculable extent. It is generally supposed that no foundation better than a rock is anywhere obtainable, and Scriptural authority instances the "wise man who built his house upon a rock." No doubt there are rocks and rocks, and although we do not question the stability of the Eddystone rock, still the question arises, with some rocks, as to what is underneath them? Small masses of rock usually lie in loose, shifty beds composed of their own fragmentary débris, and in large masses, where the strata dip considerably, there is danger of their cracking and slipping. Here concrete will come into requisition to bring the bottom up to one level. A great difference in depth should never be made suddenly between two parts of a building, either in brickwork or masonry, as the greater number of mortar joints in the deeper portion cause, in setting, cracks in the walling above. Where there is a change of depth in the foundation of a wall, it should be made gradually in steps of about four feet high, so as to divide the difference in the number of joints.

A totally unyielding bottom, such as solid rock, is at times undesirable. Suppose we have a wall of brick or rubble faced with ashlar. The greater number of joints in the former will cause a greater reduction of height in setting, and the facing may thus have to sustain a superincumbent weight which should have taken its bearing upon the walling behind, and which may crush the ashlar if the bottom be unyielding, but if the bottom yield the ashlar will sink so far as to find its level within the hearting or walling behind it. Above all, in foundations let the materials be solid and good. Eschew burrs or place bricks, and remember that good stock brickwork in mortar will safely carry between eight and nine tons for every square foot of sectional area.

DAMAGES FROM BLASTING. — A LEGAL CASE.

COLTON *vs.* ONDERDONK.

SAN FRANCISCO, CALIFORNIA.

A SUIT has lately been decided in the Superior Court where the plaintiff sued for damages to his residence caused by blasting on the adjoining lots.

In 1878 the defendant, Onderdonk, entered into a contract with Messrs. Fair & Flood (of the Bonanza firm) to grade the lots on California Street which adjoin the property of the late D. D. Colton, Esq.; the upper surface soil was apparently sand, loam and loose rock, but after removing this to a depth of two or three feet, shale or trap rock and boulders were met which necessitated blasting to keep the large force of men busy, and also to make a profit on the work.

As it was proven the work of blasting was put in charge of an incompetent man, who laid such heavy charges as to blow in the plate-glass windows of the Colton house, and cause large cracks in the frescoed walls and joints of the wood-work. Upon the appearance of these an injunction was served, and the work was afterward carried on under the supervision of an engineer.

Upon suit being brought for damages, the defendant, outside of the usual technicalities resorted to for a nonsuit, set up the defence: first, that due care was used in the grading of the lot, and second, that the house was poorly constructed and the damage was mainly caused by settling and shrinkage.

The writer was called as an expert to make an examination, to give estimate of damages, and to suggest a theory of the cause of damage. At that time the attorneys for plaintiff and others consulted were under the impression that a shock similar to an earthquake had shaken the house, but the writer thought otherwise, and as was afterwards proven, rightly suggested the theory that concussion of air did the damage.

From trials made, at a distance of ten feet from where earth is loosened no visible tremor is felt in the hard soil after a very hard blast has been exploded. Damages were estimated at $15,000.

The writer was sustained by two artists in court in saying that the frescoing could not be patched so as to be equal to original work and of course would have to be done over complete, one estimating $9,000, the other $11,000, as the cost of replacing the same. After proving even by witnesses for defense that the house was more than well built, the defense put on some curious witnesses, one of whom testified that a charge of one hundred pounds of powder was not heard across the street in a house where he and another were listening. Another, a fresco artist, would patch up for $475, though there were not less than one hundred and fifty large cracks which would have to be done; upon being cross-questioned he acknowledged the fact that about ten three-quarter-size nude figures would have to be replaced at an expense of two thousand dollars alone, and the gold might cost from one to ten hundred dollars, yet he persisted in saying he would do the whole for four hundred and seventy-five dollars.

Without going into further details of the trial, which lasted over six days, the interesting point was the charge of the judge to the jury, in which he says "*no matter how carefully the work was done* the defendant is liable for all damage done to the surrounding property."

The jury, after a short deliberation, gave a verdict for plaintiff placing damages at $7,500.

The case is now on appeal, and I will send the decision as to some legal points which may be of interest to you. S.

THE BURNING OF THE RATH-HAUS TOWERS AT AIX-LA-CHAPELLE.

IT is a common saying that "they do these things better in France." Now, however inferior we may be supposed to be by some people to the French, we may certainly pride ourselves in being immensely in advance of the Germans in our methods of extinguishing fires when they break out in our towns. Notwithstanding what we have to say of some individuals who appear to have acted with good sense and courage, we have little hesitation in asserting that such a scene of muddle and confusion as that witnessed at Aix-la-Chapelle could scarcely have taken place in any English village, to say nothing of a large and important city.

If we may believe a writer in the *Germania*, no decided effort was made to extinguish the fire which broke out in one of the narrow streets surrounding the town-hall, until several houses and the town-hall were noticed to be on fire. The writer says that one good common-sense woman extinguished the fire which had broken out in one of the houses, by emptying the contents of a tin jug upon it two or three times, showing how easy it would have been to extinguish the conflagration if it had only have been taken in time; but, wonderful to relate, although smoke was seen rising from the "Granusthurm," or eastern steeple of the town-hall, nothing whatever was done to "extinguish the fire for over twenty minutes!" The good old woman with her tin jug would have settled the matter in a few seconds, but the whole force of German officialism, with its cumbrous police of arrangements, was evidently struck all of a heap by a fire breaking out in a town-hall; so for twenty minutes no efforts whatever were made to save this magnificent old structure, while the German police, firemen, and Government officials were looking on. The Granusthurm burst out into flame, the streams of molten copper and lead pouring down in all directions, until, at last, with an immense crash, the great bulbous spire fell in, setting fire to the roof of the Kaisersaal, which occupies the space between the two great towers. Now, will it be believed that a large force of military and police were present, but that, instead of making any attempt to save the noble old Rath-Haus, or *even to extinguish the flames*, they occupied themselves in taking the furniture out of the houses which were not in flames, though it is evident from the writer in the *Germania* that the crowd had absolutely called attention to the fact that the Granus-

thurm was in danger of destruction? With such blundering it is by no means wonderful that the other lofty steeple at the west end of the Rath-Haus, which stands over the repository for the town records, was soon on fire. The force of the flames was now so intense that this vast tower twisted round and fell headlong into the blazing mass. Twenty other buildings, chiefly private houses, were soon on fire, and the greatest danger was anticipated for the wonderful old Cathedral, the iron-work upon the roof of which was red-hot. The fire, however, which up to this time appears to have received little check at the hands of man, did at length meet with an obstacle raised by hands which have for five centuries gone to their rest, and this was the splendidly-constructed vaulted roof of the Kaisersaal, which resisted the force of this burning furnace, the streams of molten lead and copper, the fall of the timber spires, and all the other dangers. It is simply wonderful, the safety which a vaulted roof is to a building. The cathedrals of Chartres and Rouen, and the choir of Canterbury, would have been reduced to ruin by fire but for their roofs of stone. York Cathedral has been twice reduced to ruin through its roof vaulting being composed of timber. Judging from Hollar's view of Old St. Paul's the vaulting over the nave of that church appears to have been constructed of wood, and this may account for its destruction in the Great Fire of London.

When the old Houses of Parliament were burned down, everything was destroyed, except the cloisters and crypt of St. Stephen's Chapel, and these were the only portions of the building which were vaulted in stone.

That the Kaisersaal at Aix-la-Chapelle owes its safety to this cause alone need scarcely be a matter of doubt, for every single thing that could be burned was burned until the fire met with this obstruction. And does this not caution us that no public building is safe from the danger of fire without a stone or brick or concrete vault?

When one thinks how comparatively cheap vaulting is, how unaccountable is the fact that in England we hardly ever make use of it, even in our churches!

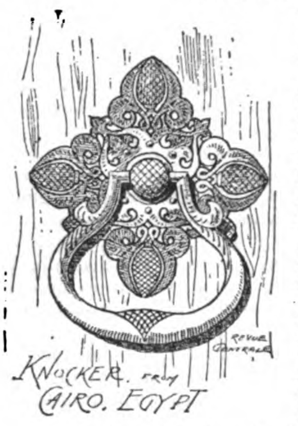
But for this stone-vaulted roof not only the Rath-Haus at Aix-la-Chapelle, but the Cathedral, — nay, the whole town, — might be now a heap of ashes. We should strongly recommend the good people of Aix-la-Chapelle to vault even their private houses with brick or stone, because if the intelligent officials whose duty it is to put out fires stand by and look at a public building burning for twenty minutes or half an hour without its striking them that a little water might be of use, it is highly probable that a good deal of burning may take place in the fine old city, and they cannot always trust to having the good old lady with her jug at hand. Our readers will scarcely believe that this fire at Aix-la-Chapelle broke out at two o'clock in the afternoon, so that it was immediately discovered, nor will they wonder less when we tell them that the very writer in the *Germania*, who has given such a graphic account of the matter, absolutely warned the authorities of the city only eight days back of the great danger of such a catastrophe and of the inefficiency of the arrangements to avoid or subdue it. We trust, however, that the very severe lesson which the authorities of the town have received may not only make them more vigilant and careful and more prepared to cope with such an outbreak in future, but that it may also read a lesson to people nearer home. Fires are certain to take place in our towns, and the danger from them does not decrease. On the contrary, the use of mineral oils and other inflammable substances, the luxurious habit of over-furnishing our houses, the rage for light gauzy substances, lace curtains, toilet covers, etc., add not a little to our danger, nor does the flimsy mode of construction adopted by our speculative builders in any way lessen our risks. We have seen an old half-timber house at Würzburg on fire, which, after three days' burning, was only injured as to its roof and upper story, whereas a short time back we saw a "neat and compact desirable brick residence" at Notting-hill burned literally to the ground in half an hour!

We do not think that the regulations with regard to fires are half severe enough, either here or on the Continent. We have frequently seen houses to let in which the hearths are all cracked and broken. Now, every house which has the hearthstone broken is in danger of catching fire. We frequently find stoves set in such a manner as to leave a deep hole on either side. These holes, which it would not probably have cost the builder 2*d.* to fill up when the stove was "set," are a serious cause of danger; the soot from the chimney falls into them, and they become clogged, they catch fire and burn for days until at last some spark finds its way to a concealed beam, and in a few hours the house is burned down.

We caution our readers and the public in general whenever they *smell burning in a house* never to rest until they have found out whence the smell proceeds, and, if there is any danger, at once to remove all risk at any trouble or inconvenience.

We have in this notice of the fire at Aix-la-Chapelle taken our view of the case from a writer in the *Germania*, and, of course, do not vouch for all the facts which he states; but as he was evidently a spectator of the scene, as he writes with a thorough knowledge of the subject, and, moreover, as he had previously cautioned the authorities to expect such a catastrophe, the result of which has fully justified his forebodings, we cannot help thinking that there must have been a great absence of proper precautions against the outbreak of a fire, and a most unwarrantable delay in making the most ordinary attempts to extinguish it. Knowing, as we do, how well-trained the members of the German fire-brigades generally are, we do not doubt that when they were called out they did their duty; but either their machinery must be cumbrous and out of gear, or something must have been wrong somewhere to cause such an unaccountable delay. We rather fancy that the unwieldy system of German officialism and "red tape" may in some way account for it. We have all heard the story of the king who was burned to death because "the courtiers could not settle amongst themselves whose duty and office it was to put out the flames." Possibly something of the same kind may have taken place at Aix-la-Chapelle. — *The Builder.*

MOISTURE IN WALLS.



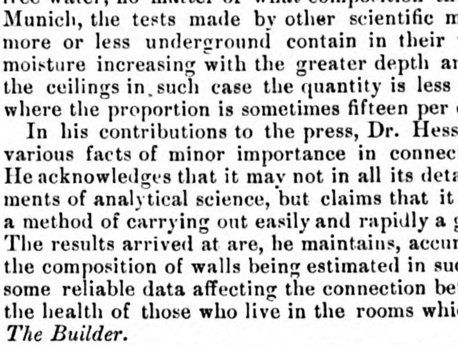
Dr. W. HESSE, a district medical official at Schwarzenberg, has communicated to the technical press of Germany a simple process for the quantitative definition of the free water which may be contained in a wall. For the carrying out of this process it is necessary to have a number of small glass flasks with glass stoppers. These should be of about one-half to five-eighths of a cubic inch capacity and of known weight. A small portion of mortar sufficient to fill one of the flasks is taken from the internal surface of the wall by boring with a tool specially constructed, and also by scraping from the wall, a piece of paper being held underneath. After the removal of any large unporous particles, the flask is filled rapidly, and well-closed with an india-rubber stopper. In the laboratory the flask itself, as well as the inner surface of the neck, is carefully dusted, the glass stopper is inserted and the flask weighed. It is then exposed in a drying-oven to a temperature of 212° to 230° Fahrenheit until the mortar is completely dry, this process usually taking several hours. The flask is then allowed to cool in an apparatus specially designed for the purpose and is again weighed. By deducting the weight of the vessel (as previously ascertained) the difference between the weight of the mortar before and after the drying is arrived at, and the percentage of moisture is thus established.

It is remarked that the mortar should not be exposed to the air more than absolutely necessary, and that consequently sifting is not to be recommended. In applying this test to inhabited rooms it is difficult to choose a spot for the trial referred to, and when any part of the wall is already broken such places can be utilized. As a general rule, such portions as are covered and are exposed to the sun's rays in summer or the heat of a stove in winter are to be avoided as not affording reliable data on the subject referred to. The best way, it is remarked, is to collect a number of specimens from the various walls of a room, taken at various heights, the principle of the test allowing of a number of trials being made.

From the results of numerous experiments made in his own district, Dr. Hesse has established the fact that walls of inhabited rooms (practically regarded as being dry) contain about one per cent of free water, no matter of what composition the mortar may be. In Munich, the tests made by other scientific men prove that rooms more or less underground contain in their walls a proportion of moisture increasing with the greater depth arrived at. Thus near the ceilings in such case the quantity is less than near the floors, where the proportion is sometimes fifteen per cent, or even more.

In his contributions to the press, Dr. Hesse has also referred to various facts of minor importance in connection with his process. He acknowledges that it may not in all its details answer the requirements of analytical science, but claims that it gives a practical man a method of carrying out easily and rapidly a great number of trials. The results arrived at are, he maintains, accurate enough to allow of the composition of walls being estimated in such a manner as to give some reliable data affecting the connection between damp walls and the health of those who live in the rooms which they encompass. — *The Builder.*

A TEST OF STRAW LUMBER.



THE *Northwestern Lumberman* gives the following interesting account of a practical test of the usefulness of straw lumber: Some of the straw lumber from the factory at Lawrence, Kan., which was purchased by John V. Farwell, was placed in his new building on Market street, Chicago, as ceiling, in which direction it serves very well, while a floor of the same material was put into a wholesale building, on the opposite side of the street. For

this use the lumber has come considerably short of the confident expectations entertained for it by both the producer and the buyer. It has made a very poor floor. This is more particularly because the material furnished is by no means equal to certain samples of straw lumber which have been shown. If it were as good as the best that has or can be turned out, it might be a very different question about the success of the flooring material. The floor in question, which the *Lumberman* representative was given opportunity to inspect, was not such a floor as would satisfy anybody very fastidious. Practically it was not a success. It is laid in inch-thick slabs about three feet square, each of which is fastened in position by small nails driven closely together around every side.

In this case the straw lumber appears to have been laid as an experiment over another floor, the slabs being first treated to a peculiar solution, which the man who had the floor on his hands stated was composed of lime and smear-kase. There was considerable trouble and expense attendant upon laying it, the slabs requiring to be placed and jointed very carefully. There was in fact more elaboration about the means than the end justified. The stuff was neither durable enough for the purpose nor devoid of warping tendencies. It was not invulnerable to the attacks of moisture and heat, the result being occasional uneven patches of surface, blisters, etc., while some of the pieces withdrew from any intimate associations with the nails, leaving part of their property behind. Where water was spilled on the floor the industrious application of a broom amounted to a triturating process. The mills had not turned out a batch of stuff that was equal to the emergency, no matter what might have been done.

It is very obvious that the utility of straw lumber depends entirely on the question of making the best possible article, and having it of uniform strength and character. The possibilities respecting future results are by no means depreciated. In the course of time, when experience shall have demonstrated what can be done in that direction, it would not be strange if the process of making straw lumber, or some similar material, will have resolved itself into an unquestioned triumph, while the newspapers will have a great deal to say about vegetable iron.

The safest way now, and that is largely the view taken by the manufacturers, is to apply straw lumber to numerous smaller uses which will not require the maximum of strength or endurance, until such time as there will be no question about the capability of the machinery in use to make it, and no uncertainty about the character of the material and its reliability. There are, in fact, a great variety of ways in which it can be employed, and the mere fact of a few discouragements at the outset, by which the lumber may appear at a disadvantage, does not do away with the probability that the most of these difficulties will be conquered, and that the scope of straw lumber in the future will be a wide one in industrial economies.

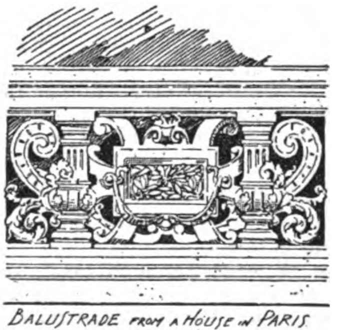
There is too much lumber now in the market, and some of it too cheap to really make it much of an object to put a new material, which has not the virtue of costing any less, into more or less heavy uses, which, to a certain extent, are experiments. The *Lumberman* has watched straw lumber from the start, has aimed to candidly consider its claims, possibilities and drawbacks, and it still has considerable faith in it on the whole as a future success.

MICROSCOPIC ORGANISMS IN BUILDING MATERIALS.

POROUS materials, such as bricks of baked clay, are often observed to become friable or pulverulent to a variable depth on their exterior, and this occurs especially where the baking has not been sufficient. M. Parize, in dwelling upon this subject in *La Nature*, writes as follows: "This species of caries, thus begun, gradually enters the brick to a greater and greater depth, and ends by reducing it to powder. Up to the present time this phenomenon has been attributed to the action of moisture, to alternations of heat and cold, etc.; but from the observations which I am about to relate, it is probable that these agencies are merely secondary ones, and that they have the effect only of favoring the action of the true cause of destruction, which, from what follows, should, as a general thing, be referred to the development of microscopic organisms. One day, on examining some mucedines that had vegetated upon a brick partition in the interior of a closed apartment which was somewhat damp, I remarked that the plastering exhibited blisters or bubble-like projections at certain points. On puncturing one of these, there issued from it a very fine red dust that had resulted from a pulverization of the brick. I at once thought of the presence of larvæ or of insects, and therefore looked for these, with a lens, among the débris. Finding nothing, I had recourse to the microscope, and, under a magnification of about three hundred diameters, saw in the midst of the débris of the diatoms and silicious algæ that had belonged to the clay from which the brick was made, an immense number of living microscopic organisms. The existence and propagation of these proto-organisms in such an environment beneath a continuous layer of plaster five to six mm. thick, has a right to surprise us; and yet this is not all. Having cleaned the rotted surface of the bricks with a stiff brush, I drilled a hole therein about thirty mm. in depth, and examined under the microscope the dust taken from the bottom of the cavity. The same organisms showed themselves, but not in so great a number (about one hundred per square centimetre of the preparation, instead of one hundred and fifty that were met with in the first observation). All the bricks that exhibited the symptoms of deterioration just described offered the same microbes in varying number. The microscopic preparation was made in each case by dropping a pinch of the dust to be studied into a few drops of pure water or alchohol, and taking a drop of the supernatant liquid. The conclusions to be drawn from these facts are numerous. They show us in the first place, that germs and spores may be preserved, so to speak, indefinitely, within surroundings that are eminently protective to them, and where no one up to the present time had dreamed of going to look for them.

"Hence is explained the utility of the disinfecting processes that are employed in apartments, hospitals or stables, in which cases of contagious diseases have occurred. The scraping and whitewashing of walls are the only prophylactic means that have, up to the present time, a known effect. It may be easily seen that these operations remove from the walls the permeable layer in which the parasitic germs have been enabled to establish themselves and multiply therein in a different stage of development from that under which they determine well-known morbid effects. Besides, these observations establish the fact that the rôle of the infinitely small is to be taken into account in the duration of buildings and other structures. We might possibly seek here the reasons for the rapid destruction of numerous Semitic monuments built of slightly baked or merely sun-dried bricks by the Assyrians and some other ancient peoples. Finally, this same cause may possibly play a rôle in the disintegration of schistose rocks, and of the agglomerates or clods that enter into the composition of arable soils."

USE OF THE THERMOMETER IN HOUSES.



SOME interesting remarks have been lately published by M. Gaston Tissandier on the difficulties presented by thermometrical observations of the temperature in rooms, no part of which is the same, especially when a fire is burning. Desiring to ascertain the extent of these differences of temperature in the same room, he had a good fire made in his study, and measured the temperature at various points by means of an accurate thermometer constructed by M. Tonnelot. He allowed the thermometer to remain for more than ten minutes at each point, and only registered the degree after two successful readings, taken two minutes apart, gave the same indication. M. Tissandier took, for his observations, three different heights, which, with the temperatures, we have converted into English measurements, viz.: 4 inches from the floor, 5 feet above the floor, and 8 inches below the ceiling. Placing the thermometer in the middle of the room, and 6 feet 6 inches from the fireplace, the temperatures were, for the same vertical line, 67 degrees Fahr. near the floor, 69 degrees midway, and 70 degrees near the ceiling. Observations made out of the fire's influence, and 3 feet from a wall, above 65 degrees near the floor, 66½ degrees in the middle, and under 70 degrees near the ceiling. At a distance of 3 feet from the window, the joints of which were very defective, the thermometer registered 64 degrees near the floor, and 65¾ degrees near the ceiling; while just near the joints of the window, the following readings were taken; 61 degrees at the bottom, 62 degrees in the middle, and 64½ degrees at the top. The temperature over the mantelpiece was 71 degrees: in fact the temperature of the room varied from 61 degrees to 71 degrees, that is to say, between 10 degrees of Fahrenheit's scale. M. Tissandier also found a difference of 1¼ degrees Centigrade, or 2¼ degrees Fahr., on comparing four high-priced thermometers; and it is probable that cheap instruments would show greater variation. To arrive at the mean temperature of a room with sufficient correctness, M. Tissandier advises that a strong thermometer, obtained from a good maker, be swung round and round by the wrist for about two minutes in two or three different parts of the room, and that the average of the readings be taken, at the same time observing the precaution of making sure that two successive readings correspond. An approximate idea may, however, be obtained by placing the thermometer on a piece of furniture, so that it may be out of the influence of the fire and of the windows. — *The Architect.*

A BOOK ON MORTARS.

Charleston, Kanawha Co., W. Va., July 21, 1883.

To the Editors of the American Architect: —

Dear Sirs, — If you have a reliable treatise on mortars, cements, etc., send description and price of same, to Wm. R. Malone.

[Gillmore on Limes, Hydraulic Cements and Mortars. Published by Van Nostrand & Co., New York. Price, $4.00. — Eds. American Architect.]

FLITCH-PLATE GIRDERS.

Boston, July 16, 1883.

To the Editors of the American Architect: —

Dear Sirs, — My attention has been called to two errors in the article on flitch-plate girders, published on page 255 of the *American Architect* of June 2.

In Formula 1, the number 720, before *t*, should read 750, as in Formula 2; and in the value for *D*, eleventh line from the top, second column, the sign between the numbers 12 and 1500 in the denominator should be + instead of ×. The equation is worked out for the sign +, but in copying the manuscript the sign was changed, as was also the number 750, above referred to.

Respectfully,
F. E. Kidder.

EXTERIOR PLASTER-WORK ON WIRE-LATH.

July 26, 1883.

To the Editors of the American Architect: —

Dear Sirs, — I wish to cement face or plaster upon wire lathing the exterior of a frame house. Selenitic cement has been recommended to me for that purpose. What material and method of application has been found the most successful? And finally, if the best be employed, what will be the durability of the same? Is it liable to crack, etc., by shrinkage of the framing timber, or the materials of which the plaster is made?

Very respectfully yours, J.

[We have never used selenitic cement, but think it might be excellent for the purpose mentioned. Lime mortar, with a greater or less admixture of cement, is commonly used, and as generally employed in gables or other places somewhat sheltered from the weather, will stand for many years. For work on a larger scale, or near the ground, cement only is used. Fresh Rosendale of the best quality would probably answer, if its color were not objectionable, though Portland would be better; and selenitic cement ought to be nearly as good as Portland, and of a better color. A considerable admixture of sawdust is advantageous for binding the mortar together, and so made, and put on wire lath, it ought to be nearly indestructible. If the furrings to which the wire is nailed all run in the same direction, and are so put on as not to be moved by the shrinkage of the timbers to which they are themselves nailed, there is very little danger of cracks in the coating, even with lime mortar. The wire lathing should, however, be of the heaviest quality, as the springing of a weak lathing is apt to cause the mortar coat to peel off in places, while being rubbed with the trowel. It is common with the lighter qualities to put the furrings six or eight inches from centres. — Eds. American Architect.]

SEASONING BUILDING-STONE.

Chicago, July 25, 1883.

To the Editors of the American Architect: —

Dear Sirs, — M. Viollet-le-Duc in his "Story of a House," says that stone, after leaving the quarry, will get a weather-resisting crust by the aid of their quarry water, which once taken off will never be re-formed afterwards; and for which reason it would be best to cut the stones when fresh from the quarry and not afterward, or cut them only roughly before, and dress them after they have been built. But in another article (which appeared, I think, in your paper) I read that the excellent preservation of stone on some historic buildings in England is due to their seasoning, *i. e.*, they had been lying at the seaside (if I remember) for one or two years to season, before they were used in the building. You would oblige me by stating in your paper which method is the best, and if Viollet-le-Duc is wrong?

Very respectfully, A Subscriber.

[Viollet-le-Duc speaks particularly of limestone, which is the common building-stone in France, and, as he says, acquires, if cut while fresh, a hard coating by the evaporation of the "quarry sap," and the crystallization of the dissolved mineral matters in the superficial pores of the stone. With the sandstones, containing little or no lime, which are generally used in England and in this country, the quarry-sap contains usually much less crystallizable matter, and while some sorts get a hard skin if cut while fresh, others show no difference. As a general rule, the more thoroughly dry a stone is when placed in the building, the better, and even where stones require to be cut while fresh to secure the natural patina, it is advantageous to leave them after cutting until completely dried out, before setting them in place. — Eds. American Architect.]

NOTES AND CLIPPINGS.

British Building Societies. — The Scotch, compared with the English, have hitherto made scarcely any effort to provide themselves with better houses through the agency of building societies. It is estimated that, at the present time, there are in the United Kingdom no less than 750,000 members of building societies; and out of this number only 14,000 belong to Scotland and 7,000 to Ireland. No satisfactory explanation can be given of this striking disparity. The difference between England and Scotland is probably in part due to the fact that the system of registration of building societies is less complete in Scotland. But after making due allowance for this circumstance, it seems difficult to resist the conclusion that the thrift for which the Scotch are proverbial has unfortunately in too many cases not hitherto assumed the form of providing themselves with good dwellings. — *Macmillan's Magazine.*

Sinking Piles by the Water-Jet. — *Engineering News* translates from the *Annales des Travaux Publics* a short description of the method used in sinking the piles for the foundation of the Palais de Justice at Brunswick (Prussia): —

A framework with hoisting fall somewhat similar to the ordinary pile-driver, was used in placing the pile in position ready for sinking; two tubes, each two inches in diameter, with the lower ends bent inward toward the point of the piles, were attached to the pile by iron staples; at the upper end each pipe was connected by a short section of rubber hose to other pipes connected with the city water-main, which water-supply was in this case under a pressure of four atmospheres. The piles usually sunk by their own weight into the hole formed by the water-jet, as soon as the valve was opened, making connections between the tubes on the pile and the water-main. To hasten the rate of settlement, a vertical iron bar three feet long was set into a hole bored in the head of the pile, and upon this were placed iron weights of two hundred pounds each, as the resistance might require. Piles twelve inches in diameter were sunk in this way to a depth of fifteen feet in ten minutes' time. The least time required for a depth of fifteen feet was two minutes, the longest time for same depth was thirty minutes. As long as the water-jet was in operation at the foot of the pile it was possible to give the pile a rotary motion, and thus facilitate the descent; but as soon as the jet was stopped the pile became immovable. As a proof of their stability a dead weight of fifty tons was applied to some of them, and it was found that their resistance was entirely independent of the time consumed in sinking them. To sink twenty piles by this method required the use of about two thousand gallons of water; seven or eight laborers were employed, and one gang put down from six to fourteen piles per day.

L'Eglise du Sacre Cœur. — The great Church of the Sacred Heart, now in course of construction on the heights of Montmartre, Paris, is at the present season being visited by thousands of persons daily, numerous expeditions, which the French dignify by the name of pilgrimages, having been organized from nearly every parish in Paris and around, for the purpose of inspecting the progress of this great religious undertaking. After the services that are held every day in the temporary chapel, the congregation forms into procession and visits the work. First making the round of the entire edifice, the *cortège* enters the main body of the church, and truly curious but at the same time imposing is the view of the long procession with crosses and banners at their head, wending in and out of the wilderness of scaffold-beams, amid the grinding noise of the material-wagons, and the shrill whistle of the steam-engines. The crypt of the building, which is entirely freed from scaffolding, may now be seen throughout, and its grand proportions serve to give some idea of the scale upon which the future cathedral is designed. A chapel devoted to the offering of prayers for the dead, has already been opened here in the middle of the great nave, exactly under the spot where it is intended to erect the high altar of the upper church. The outline of the main building, which twelve months ago was scarcely commenced, is now taking form; the side walls are built to about half their height, and before the end of the year it is hoped to bring them up to the spring of the vault. The first six courses of the circumference of the choir are finished, while the second course of the apsidal side chapels is being placed. At the other end of the church the double porch preceding the principal entrance is already covered in, and the latter will be next begun. The financial prospects of the work were never brighter than at the present time, the subscriptions received during April having amounted to 126,964 frs., 48 c., against an average sum of 92,000 frs. received in the corresponding month of the ten previous years. The total amount collected up to the present reaches 12,500,000 frs., of which 11,700,000 frs. have been expended, leaving in hand an available balance of about 800,000 frs. — *The Architect.*

Spontaneous Combustion of Soot. — In the spring of 1780, a fire was discovered on board a frigate off Cronstadt. After the severest scrutiny, no cause for the fire could be found. The probability is, however, strongly in favor of spontaneous combustion; for, in the following year the frigate Maria, which also lay at anchor off Cronstadt, was found to be on fire. The fire was, however, early perceived and extinguished. After strict examination nothing could be discovered as to its origin. A commission of inquiry was held, which finally reported that the fire was probably caused by parcels of matting tied together with pack-thread, which were in the cabin where the fire broke out. It was found that the parcels of matting contained Russian lamp-black, prepared from fir-soot moistened with hemp-oil varnish. In consequence of this, the Russian Admiralty gave orders for experiments to be made. They shook forty pounds of fir-wood soot into a tub, and poured about thirty-five pounds of hemp-oil varnish upon it. This stood for an hour, after which they poured off the oil. The remaining mixture they wrapped up in a mat, and the bundle was laid close to the cabin in the frigate Maria where the midshipmen had their berth. To avoid all suspicion two officers sealed both the mat and the door with their own seals, and stationed a watch of four officers to take notice of all that passed through the night. As soon as smoke should appear information was to be given. The experiment was made about the 26th of April, at about 11 A. M. Early on the following morning, about 5 A.M., smoke appeared issuing from the cabin. The commander was immediately informed by an officer, who, through a small hole in the door, saw the mat smoking. Without opening the door, he dispatched a messenger to the members of the commission; but as the smoke became stronger and fire began to appear, it became necessary to break the seal and open the door. No sooner was the air admitted than the mat began to burn with greater force, and presently burst into a flame. Mr. Georgi, of the Imperial Academy of Sciences, was appointed to make further experiments, the result of which confirmed the suspicion of spontaneous combustion in a remarkable degree. — *Chambers' Journal.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

281,661. FIRE-ESCAPE. — Orin R. Bowie, Portland, Me.

281,679. WALL-DECORATION. — Henry Fechteler, New York, N. Y.

281,685. GAS-STOVE. — Edward E. Gold, New York, N. Y.

281,692. AUTOMATIC GATE. — Daniel Hershberger, Millville, Ind.

281,701. KNOB ATTACHMENT. — John Kirby, Jr., Ludlow, Ky.

281,713. LOCK. — Frank W. Mix, New Britain, Conn.

281,714. SASH-FASTENER. — Alphonse Montant, New York, N. Y.

281,721. WOOD-FILLER. — Richard Parke, New York, N. Y.

281,722. SYSTEM OF LAYING SUBTERRANEAN ELECTRICAL CONDUCTORS. — Wm. R. Patterson, Chicago, Ill., assignor to the Western Electric Company, same place.

281,726. DAMPER REGULATOR, INDICATOR, AND LOCK. — E. Otto Pohl, Philadelphia, Pa.

281,748. SHUTTER-WORKER. — Ambrose C. Wyckoff, Danville, Va.

281,749. HYDRAULIC-RAM. — George Yellott, Towson, Md.

281,761. SQUARE. — Charles W. Green, Brooklyn, N. Y.

281,768. SASH-FASTENER. — Morton Judd, Wallingford, Conn.

281,781. HYDRAULIC ELEVATOR. — Wm. H. Milliken, San Francisco, Cal.

281,795. HEATING-STOVE. — C. L. Ridgway, Boston, Mass.

281,802. WEATHER-STRIP. — Jno. Shoemaker, Garner, Io.

281,805. EXTENSION-LADDER. — Joseph Spangler, Rock Island, Ill.

281,822. LOCK. — Jacob S. Aydelot, Xenia, Ind.

281,831. WOOD-SCREW. — Israel F. Brown, New London, Conn.

281,897. RADIATOR. — Thomas McAvity, St. John, New Brunswick, Can.

281,920. BIT-STOCK. — Wm. L. Parmelee, Ansonia, Conn.

281,964. WINDOW-SCREEN FRAME. — Edmund J. Brent, Muscatine, Io.

281,965. CEMENT COMPOUND. — Walter J. Budington, Pittsfield, Mass.

281,968. FLOOR-CLAMP. — Ernest Caywood, Vining, Kans.

281,977. ADJUSTABLE LADDER. — Nelson Coons, Elizaville, N. Y.

282,004. HINGE. — David McCurdy, Ottawa, O.

282,005. SASH-FASTENER. — Riley McCloskey, and Daniel J. Coleman, Walla Walla, Wash.

282,018. KEY-HOLE GUARD. — John P. Wilkinson, Abbeville, Miss.

SUMMARY OF THE WEEK.

Baltimore.

HOTEL. — Mr. E. F. Baldwin, architect, has prepared drawings for Robert Rennert, Esq., for a six-st'y and basement building, designated Rennert's Hotel, to be erected on the cor. of Saratoga and Liberty Sts. It will be built of granite and brick, with stone and terra-cotta finish, 86′ x 120′, contain 130 rooms, and cost $180,000; Henry Smith & Son, superintendents.

BUILDING PERMITS. — Since our last report thirty-one permits have been granted, the more important of which are the following: —

Fred. Schonewolff, three-st'y brick building, s s Warren Ave., e of Henry St.

Henry Wessell, three-st'y brick building, s s Warren Ave., e of Henry St.

Chas. A. Carpenter, 15 three-st'y brick buildings, e s McCullough St., s of Presstman St.

Jas. Airey, 2 three-st'y brick buildings, e s Druid Hill Ave., n of Robert St.

Jackson Musselman, 2 three-st'y brick buildings, e s Druid Hill Ave., n of Robert St.

Swindell Bros., three-st'y brick building, cor. Bayard and Warren Sts.

C. D. Blake, 5 three-st'y brick buildings, e s Park Ave., bet. Hoffman and Dolphin Sts.

A. A. Reinhart, 11 three-st'y brick buildings, w s Calvert St., bet. Lanvale and Townsend Sts., and 13 three-st'y brick buildings, w s Calvert St., bet. Lanvale and Federal Sts.

Ansley Gill, 5 three-st'y brick buildings, commencing s w cor. Ramsay St. and Addison Alley.

Robert Rennert, six-st'y and basement brick building, s e cor. Liberty and Saratoga Sts.

D. E. Conklin, five st'y brick warehouse, w s Sharp St., bet. Lombard and Pratt Sts.

James D. Hodge, 24 two-st'y brick buildings, s s Randall St., e of Light St.

F. Thiele, two-st'y brick building, w s Spring St., bet. Baltimore and Lombard Sts.

Wm. Schanze, two-st'y brick bake-house, e s Etting St., bet. Bloom and Gold Sts.

W. S. Smith & Bro., two-st'y brick shop, w s Maryland Ave., bet. Chase and Biddle Sts.

Boston.

BUILDING PERMITS. — *Brick.* — *East Concord St.*, near Albany St., Ward 18, for Trustees Mass. Homœopathic Hospital, hospital, 45′ x 86′, four-st'y pitch; David Connery & Co., builders.

Wellington St., No. 32, Ward 18, Henrietta K. White, Hotel White, 55′ x 90′, four-st'y flat; Thos. R. White, builder.

Bunker Hill St., No. 342, Ward 4, for City of Boston, engine-house, 40′ x 80′, two-st'y hip; Robert R. Mayers, builder.

Wood. — *Washington St.*, rear, opp. Roslin St., Ward 24, for James A. King storage, 21′ x 27′ and 33′, two-st'y flat; J. & F. H. McDonald, builders.

Evans St., Ward 24, for Esther M. Hutchinson, dwell., 14′ x 18′ and 23′ x 30′, two-st'y pitch; Samuel P. Faulkner, builder.

Harvard St., near Wales St., Ward 24, for Charles Ripley, dwell., 31′ and 40′ x 36′, two-st'y pitch; S. H. L. Pierce, builder.

Fuller St., rear, near Dorchester Ave., Ward 24, for Episcopal Church Society, carriage-house, 16′ 6″ x 30′, one-st'y pitch; Alden B. Beal, builder.

B St., No. 41, Ward 13, for Ellen Cronin, dwell., 25′ x 42′ 6″, three-st'y flat; Wm. W. Doomey, builder.

Alban St., near Ashmont St., Ward 24, for Augustus Nickerson, dwell., 31′ 6″ and 38′ x 40′, two-st'y pitch; John Savage, builder.

Taber St., No. 35, rear, Ward 20, for H. S. Lawrence, 2 dwells., 20′ x 38′, three-st'y flat; J. M. Marston & Co., builders.

Dorchester Ave., No. 576, Ward 15, for Jos. Batts, dwell., 22′ x 35′, three-st'y flat.

Blue Hill Ave., rear, near Lawrence Ave., Ward 24, for Darius H. Payson & Co., storage, 24′ x 51′ 6″, one-st'y flat; George W Horton, builder.

Keyes St., near Washington St., Ward 23, for Boston Thread & Twine Co., drying-shed, 30′ x 103′, one-st'y pitch; C. H. Lewis, builder.

Spice St., near Cambridge St., Ward 4, for Allen D. Hall & Son, manufacturing, 46′ x 115′, four-st'y flat.

Unnamed St., near Crafts St., Ward 4, for Wm. R. Park; manufacturing, 34′ x 80′, two-st'y pitch.

Holmes Pl., near Mills St., for Frank R. Cushing, dwell., 14′ x 15′ and 20′ x 28′, one-st'y pitch.

Elm St., near Blue Hill Ave., Ward 24, for David Simonds, 2 dwells., 22′ and 31′ x 34′, two-st'y pitch.

Cushing Ave., near Sawyer Ave., Ward 24, for Sanford L. Treadwell, dwell., 25′ 6″ x 35′ 6″ x 32′, two-st'y pitch; Wm. J. Jobling, builder.

Church St., near Mt. Vernon St., Ward 25, Wm. H. Redhouse, dwell., 22′ x 30′, two-st'y pitch.

Saunders St., w s, Ward 22, for Amos Wright, 2 dwells., 20′ and 28′ x 14′ x 20′, two-st'y pitch, J. W. Berry, builder.

Cook St., near Washington St., Ward 24, for Wm. H. Cooper, dwell., 14′ x 15′ and 21′ x 28′, two-st'y pitch; J. H. Wilder, builder.

Unnamed St., near Stark St., Ward 4, for R. S. Barrett, dye-house, 23′ x 35′, two-st'y pitch; L. L. Libby.

Brooklyn.

ASYLUM. — The Brooklyn Nursery Association is about to erect a new building for a children's home in Herkimer St., near Kingston Ave., to cost, $30,000.

BUILDING PERMITS. — *Wall St.*, s s, 250′ e Broadway, two-st'y frame tenement and two-st'y frame shop, tin roofs; cost, $4,000; owner, Dora Blank, 474 Broadway; architect, R. Von Lehn; builders, L. Fuchs and J. Frey.

Pearl St., Nos. 124 *to* 130, w s, 100′ s York St., four-st'y brick factory, gravel roofing; cost, $50,000; owners, L. Prahar & Bro., Five Points, Mission Pl., New York City; architect, E. Sniffen; builders, Van Dolson & Arnott and Jones & Taylor.

Myrtle Ave., Nos. 282 *and* 284, n s, e of Canton St., 2 four-st'y brick stores and tenements, tin roofs; cost, $16,000; owner, Henry Hoffman, Adams St.; architect, M. Thomas; builders, F. J. Kelly and Morris & Selover.

Green St., No. 112, near Oakland St., three-st'y frame double tenement, tin roof; cost, $4,000; owner, Geo. Kennert, 210 Green St.; architect, J. Mulhaul; builders, Randall & Miller.

Herkimer St., s s, 200′ e Kingston Ave., four-st'y brick building (Home for Children), tin roof; cost, $30,000; owner, the Brooklyn Nursery; architect, M. Thomas; builders, F. J. Kelly and Duryee & Losee.

Broadway, No. 891, e s, 25′ s Suydam St., three-st'y brick store and tenement, tin roof; cost, $6,300; owner, Jacob Sauerbrunns, Hamburg, Erie Co., New York; architect, T. Engelhardt; builders, G. Lehrian & Son and J. Frisse.

Union St., n s, 160′ e Smith St., 3 three-st'y brownstone front dwells., tin roofs, iron cornices; cost, each, $8,000; owner, W. H. Algie, 881 Tenth Ave., New York City; architect, J. Barrett; builder, P. Algie.

Meeker Ave., No. 88, s s, 210′ 8″ w North Henry St., three-st'y frame double tenement; cost, $3,600; owner, Jas. Canty, 40 Meeker Ave.; architects and builders, Sammis & Bedford; mason, L. Brezinski.

De Kalb Ave., s s, 150′ w Marcy Ave., 4 one-st'y brick double stores and tenements, gravel roofs; cost, total, $15,800; owner, R. L Belknap, 203 Montague st.; architects and builders, H. D. and W. A. Southard.

Gates Ave., n s, 22′ 3″ w Reid Ave., 3 three-st'y brick stores and tenements, tin roofs; cost, total, $12,000; owner, Francis E. Pouch, 305 Adams St.; architect, G. R. Dietrick; builder, C. Dietrick.

Stanhope St., s s, 200′ w Evergreen Ave., 3 two-st'y frame dwells., tin roofs; cost, each, $1,600; owner and builder, E. C. Bauer, 22 Stanhope St.

Lincoln Pl., s s, 200′ w Seventh Ave., 5 four-st'y brownstone front dwells., tin roofs; owner and

Stuyvesant Ave., e s, 80′ n Pulaski St., two-st'y frame dwell., tin roof; cost, $3,200; owner and builder, John H. Miller, cor. Stuyvesant Ave. and Pulaski St.; architect, John Herr.

builder, Thos. Fagan, on premises; architect, R. Dixon.

Lorimer St., s e cor. Richardson St., 3 three-st'y brick tenements, tin roofs; cost, total, $11,000; owner, Martin Reynolds, 172 Jackson St.; architect and builder, A. Herbert; carpenter, J. Wilson.

Butler St., Nos. 102 *and* 104, s s, 160′ w Hoyt St., 2 three-st'y brick tenements, tin roofs; cost, each, about $5,000; owner, Jno. F. Peppord, Hoyt St., cor. Dean St.; architect, F. E. Lockwood.

Jefferson St., n s, 106′ 5″ w Evergreen Ave., 3 two-st'y frame tenements, tin roofs; cost, each, $2,500; owner, C. Threshmann, 127 Jefferson St.; architect, T. Engelhardt.

Hicks St., w s, 25′ s Pineapple St., 5 three-st'y brownstone and brick front dwells., tin roofs and mansards: cost, each, $9,000; owner, Thos. P. Hurlbut, 104 Hicks St.; architect, G. L. Morse; builders, P. Carlin & Sons.

Berkeley Pl., Nos. 42 *and* 44, s s, 342′ w Sixth Ave., 2 three-st'y brownstone front dwells., tin roofs; cost, each, $5,000; owner, Catharine J. Tewell, 449 Ninth St.; architect, A. Hill; builder, E. Hughes.

Evergreen Ave., w s, 50′ s Stockholm St., 3 two-st'y frame dwells., tin roofs; cost, each, $2,000; owner, S. S. Morehouse, 516 Lexington Ave.; architect and builder, D. B. Morehouse.

Van Buren St., n s, 100′ e Stuyvesant Ave., 7 two-st'y brick dwells., tin roofs; cost, each, $2,750; owner and architect, Wm. Godfrey, 139 Stuyvesant Ave.; builder, J. D. Remsen.

Reid Ave., s w cor. Van Buren St., three-st'y brownstone front store and tenements, tin roofs; cost, each, $6,000; owner, Edward Webb, United States Hotel, New York City; architect, Wm. Godfrey.

Sixteenth St., n s, 198′ 5″ w Third Ave., 2 three-st'y brick flats, gravel roofs: cost, each, $3,000; Jas. S. Bailey, Harrison St., cor. Strong Pl.; architects and builders, Leclair & Greer; mason, H. O'Brien.

Lafayette Ave., n e cor. Ryerson St., four-st'y brick double flat, gravel roof; cost, $35,000; owner and builder, D. H. Fowler, 14 Verona Pl.; architect, A. Hill; mason, W. Kane.

Butler St., s s, 150′ w Classon Ave., four-st'y brick double tenement, tin roof; cost, $8,000; owner, P. J. Gilson, 656 Douglass St.; architect, T. F. Houghton; builders, P. McGuinn and D. Ryan.

Boerum St., s e cor. Humboldt St., 3 three-st'y frame store and tenements, tin roofs; cost, $5,000; owner, —— Zengle, Boerum St., near Humboldt St.; architect, J. Platt; builder, J. Rauth.

Tompkins Ave., No. 38, w s, 25′ s Ellery St., three-st'y frame double tenement, tin roof; cost, $4,500; owner, Henry Rockelhauser, 30 Tompkins Ave.; architect, T. Engelhardt; builder, H. Loeffler.

Hart St., n s, 90′ e Sumner Ave.; also, *Lewis Ave.*, w s, 40′ s Hart St., 6 two-st'y brick, stone front dwells.; cost, each, $4,500; owner, Thos. J. Moore, 72 Sumner Ave.; architect and builder, Jno. Erickson.

Evergreen Ave., s w cor. Woodbine St., three-st'y brick store and flat, tin roof; cost, $8,000; owner, Louis Bradt, 512 Fulton St.; architect, J. D. Reynolds; builders, J. J. Cody and F. Marryatt.

Withers St., n w cor. Ewen St., 2 three-st'y frame double tenements, tin roofs; cost, $4,800 and $4,200; owner, Henry Warnke, 12 Judge St.; architect, G. Hillenbrand; builders, C. Buchheit and Thoma & Wade.

North Tenth St., n s, 225′ w Third St., four-st'y brick shop, gravel roof; cost, $13,000; owners, Poulson & Egar, North Eleventh St.; architect, F. Winslow; builders, W. & T. Lamb, Jr.

Marcy Ave., e s, 20′ s Putnam Ave., 4 two-st'y brownstone front dwells., tin roofs; cost, each, $5,000; owners and builders, Lambert & Mason, 148 Putnam Ave.; architect, A. Hill.

Marcy Ave., s e cor. Putnam Ave., three-st'y brownstone front dwell., tin roof; cost, $7,000; owners, etc., same as last.

Withers St., s s, 135′ e Humboldt St., 2 two-st'y frame tenements, tin roofs; cost, each, $2,100; owner, architect and builder, August Trinkmann, 198 Withers St.; carpenter, H. C. Bauer.

Madison St., s s, 80′ e Tompkins Ave., two-st'y brick dwell., tin roof; cost, $4,500; owner, Paul C. Grening, 420 Gates Ave.

Halsey St., n e cor. Reid Ave., three-st'y brick store and tenement, tin roof; cost, $8,000; owner, Paul C. Grening, 420 Gates Ave.

ALTERATIONS. — *Putnam Ave., No.* 194, three-st'y and basement extension; cost, $3,500; owner, Jas. A. Blake, on premises; architect and builder, W. H. Burhans.

North Second St., s s, 192′ w Fifth St., raised four stories; cost, $6,000; owner, F. Haberman, on premises; architects, Thom & Wilson; builder, J. McQuaid.

Montague St., s w cor. Columbia Heights, one-st'y brick extension, tin roof; cost, $7,000; owner, Geo. I. Seney, 123 Remsen St.; architect, J. Mumford; builders, C. Cameron and W. C. Booth.

Ryerson St., e s, 67′ n Lafayette Ave., church raised and altered to flat, new front, etc.; cost, $10,500; owner and builder, D. H. Fowler, 14 Verona Pl.; architect, A. Hill; mason, W. Kane.

Chicago.

OFFICE-BUILDING. — Burnham & Root, architects, have completed plans for an office-building to be erected for Charles Counselman, ten-st'y, 60′ x 60′, Anderson pressed brick, and cost, $100,000.

HOUSES. — Burnham & Root, architects, have plans ready for 2 houses for Messrs. Mathews & Cornwell, to be of brick and brownstone, two-st'y, 50′ x 80′.

Plans by same architects are ready for house on Washington Boulevard, for Mr. Christy.

Same architects have completed plans for house to be built at Hyde Park, for Miss Barnett.

BUILDING PERMITS. — Jno. Watkins, three-st'y flats, 181 South Morgan St.; cost, $6,000; architect, Mr. Ruehl; builder, Jno. Gallagher.

Fred. Grothe, two-st'y and basement dwell., 587 West Twelfth St.; cost, $4,000; architect, P. W. Ruehl; builder, Chas. Threle.

Anton Melka, three-st'y dwell., 78 Ewing St.; architect, B. Ruehl; builder, Jno. Kralore; cost, $6,000.

Thos. Connelly, two-st'y dwell., 276 Loomis St.; cost, $4,000.

Albert Crane, 5 one-st'y cottages, 2935–2943 South Halsted St.; cost, $5,000.

Milo George, three-st'y flats, 248 East Indiana St.; cost, $6,500; builder, C. Busby.

C. Busby, two-st'y flats, 215–221 South Peoria St.; cost, $16,000; architect, C. M. Palmer; builder, C. Busby.

Ed. Kauer, three-st'y dwell., 195 East Superior St.; cost, $3,500.

G. Snydacker, 3 three-st'y dwells., Grand Boulevard, cor. Thirty-fifth St.; cost, $15,000; architect, F. Bowman; builder, J. Rutgford.

A. Jendrzejek, two-st'y and basement brick store and dwell., 657 Holt Ave.; cost, $6,000; architect, H. Meisner; builder, P. Wauzek.

P. W. Ruehl, two-st'y flats, 663 South Ashland Ave.; cost, $4,000.

M. W. Folz, two-st'y store and dwell., 596 Butler St.; cost, $3,200.

Geo. Morton, two-st'y store and dwell., 1128 Harrison St.; cost, $4,500.

F. W. Buehler, two-st'y and basement flats, 123 Twenty-first St.; cost, $2,500.

M. J. Illingworth, three-st'y flats, 352 and 354 Randolph St.; cost, $10,000; architect, Geo. Zucker; builder, Jno. Hall.

A. Rednarick, two-st'y and basement dwell., 15 Emma St.; cost, $3,400; builder, Peter Kaltenex.

A. Szerkoskie, two-st'y and basement dwell., 93 Cleaver St.; builder, Peter Kaltenex; cost, $3,700.

Mrs. Isabella McCleive, three-st'y and basement store and dwell., 627 West Van Buren St.; cost, $6,000; architect, John Clifford; builder, Fred. Housen.

R. Schmeling, two-st'y store and dwell., Milwaukee Ave.; cost, $3,000; builder, Fred. Housen.

Tho. Patterson, three-st'y and basement dwell.; cost, $5,000; architect and builder, J. H. Mathson.

C. Brinkman, two-st'y and basement dwell., 524 Union St.; cost, $4,000; architect, P. Ruehl; builders, Grosser & Hoppe.

C. A. Daniels, two-st'y dwell., 143 Sangamon St.; cost, $5,000; architect, W. Strippleman; builders, Grosser & Hoppe.

Mrs. T. Topping, two-st'y and basement store and dwell., 1031 West Madison St.; cost, $4,000; architect, A. Bates.

Ewing Estate, three-st'y warehouse-building, 55 and 57 Clinton St.; cost, $10,000; architect, J. M. Van Osdel; builder, Thos. Nicholson.

Samuel Cohen, three-st'y store and flats, 3653 Halsted St.; cost, $6,000; builders, Wm. Goldin & Son.

Knapick & Gilmeister, four-st'y factory; cost, $5,000.

Mrs. E. Fernow, two-st'y dwell., 646 Lasalle Ave.; cost, $6,000; architects, Trammonn & Jepson; builder, D. Kobell.

Wm. Woodrow, three-st'y flats, 111 South Morgan St.; cost, $6,000; architect, F. W. Cassell; builder, C. Champson.

A. Monke, two-st'y store and dwell., 430 North Lincoln St.; cost, $3,500.

S. E. Gross, 11 cottages, Western Ave.; cost, $11,000.

S. E. Gross, 10 cottages, Thomas St.; cost, $10,000.

S. E. Gross, 10 cottages, Shreve St.; cost, $10,000.

Wm. E. Rollo, 6 three-st'y dwells., 110–118 Monroe St.; cost, $14,000; architect, W. L. Carroll; builder, B. G. Robinson.

Chas. Moasar, three-st'y and basement store and flats, 153 North Ave.; cost, $8,000; architect and builder, Geo. Tegmeyer.

Theo. Klein, two-st'y and basement store and flats; cost, $5,000.

E. Harlan, 4 three-st'y and basement dwells., 529–535 Belden St.; cost, $16,000, architect, Geo. Spohr.

Marshall Field, 10 two-st'y dwells., Leavitt St.; cost, $14,000.

Jno. Dahmke, three-st'y and basement store and flats, 984–986 Lake St.; cost, $20,000; architects, Furst & Rudolph.

W. S. Brophy, two-st'y dwell., Monroe St.; cost, $6,500.

A. Booth, two-st'y barn; cost, $6,000; architect, Wadskier.

M. A. Eager, two-st'y dwell., Vernon Ave.; cost, $5,600; architect, A. Smith; builders, W. A. & A. E. Wells.

J. P. Hampson, three-st'y dwell., 326 East Indiana St.; cost, $6,000; architect, M. Hanson; builder, C. Luhring.

Chas. Sokup, four-st'y and basement stores and flats, 143 and 145 Front St.; cost, $10,000; architect, J. Zucker; builder, W. Mayne.

C. M. Hoffman, three-st'y stores and flats; cost, $5,000.

Cincinnati.

BUILDING PERMITS. — Henry A. Stone, two-st'y brick building, 147 Richmond St.; cost, $4,000.

M. Taitman, two-and-one-half-st'y brick building, 392 John St.; cost, $5,000.

Henry Baasch, two-st'y brick building, Corry St.; cost, $3,000.

Mrs. Mary Reiger, two-st'y brick building, Third St.; cost, $2,500.

Jos. Schroeder, three-st'y brick building, 357 Longworth St.; cost, $4,500.

Jos. S. Burnett, four-st'y brick building, e s Central Ave., between Eighth and Ninth Sts.; cost, $6,500.

T. McDonough, two-st'y frame building, Warsaw Pike; cost, $4,500.

Wm. E. Dibble, six-st'y brick warehouse, Nos. 5 and 7 West Fourth St.; cost, $9,000.

Robert Mitchell, repair six-st'y brick building, Baker St., between Vine and Race Sts.; cost, $3,000.

The Moerlein Brewing Company, three-st'y brick stables, n e cor. Henry and Dunlap Sts.; cost, $25,000.

Adam Deters, two-and-one-half-st'y brick building, 158 Oliver St.; cost, $4,000.

Wm. Ludlow, 2 two-st'y brick buildings, e cor. Kenton and Wayne Sts.; cost, $7,500.

W. M. Wicker, 2 three-st'y brick buildings, 475 Seventh St.; cost, $6,000.

Andy McCormack, three-st'y brick building, 158 Main St.; cost, $3,000.

New York.

HOTEL COMPANY. — Articles of incorporation of the Delmonico Company, having for its object the building and leasing of hotels in the United States, with a capital of $260,000, have been filed.

BUILDING PERMITS. — *Fifty-second St.*, *No.* 560, w, five-st'y brick tenement, tin roof; cost, $15,000; owner, John Klinker, s e cor. Eleventh Ave. and Fifty-second Sts.; architect, C. F. Ridder, Jr.

Fifty-second St., *No.* 562, w, five-st'y brick tenement and store, tin roof; cost, $11,000; owner, architect, etc., same as last.

Twenty-first St., *No.* 309, w, five-st'y brick tenement, tin roof; cost, $12,000; owner, architect and builder, Wm. S. Wright, 36′ w Twenty-seventh St.

Washington Ave., n e cor. One Hundred and Seventy-fifth St., three-st'y frame dwell., tin roof; cost, $4,000; owner, Sarah A. Carman, 613 East One Hundred and Thirty-fifth St.; architect, Samuel B. Reed; mason, John Condon.

Brook Ave., e s, 50′ s One Hundred and Forty-second St., four-st'y frame tenement, tin roof; cost, $5,000; owner, James Martin, One Hundred and Forty-second St., s s, near Brook Ave.

Sixty-first St., n s, 200′ e Tenth Ave., five-st'y brick flat, tin roof; cost, $25,000; owner, Lula P. McGarry, 583 Monroe St., Brooklyn; architect, R. Rosenstock.

West Thirty-eighth St., *No.* 409, five-st'y brick tenement, tin roof; cost, $16,500; owner, Edward Gallan, executor, 305 West Forty-first St.; architect, M. L. Ungush; builder, E. L. Gallan.

Third Ave., w s, 61′ s One Hundred and Sixty-eighth St., 3 five-st'y brick tenements, tin roofs; cost, $11,000; owner, Jacob Stahl, Franklin Ave., near One Hundred and Sixty-ninth St.; architect, Julius Kastner.

Third Ave., w s One Hundred and Fifty-first St., s One Hundred and Sixty-eighth St., five-st'y brick factory, tin roof; cost, $10,000; owner and architect, same as last.

Suffolk St., *No.* 33, three-st'y brick store, tin roof; cost, $7,000; owner, James Barclay, 64 West Thirty-eighth St.; architect, Julius Boekell.

Sixty-first St., n s, 200′ w Tenth Ave. (8 houses), *Sixty-ninth St.*, s s, 100′ w Eleventh Ave. (4 houses) 12 five-st'y brick tenements, tin roofs; cost, $18,000; owner and builder, Ed. A. Davis, s w cor. Eleventh Ave. and Sixty-ninth St.; architect, Jas. Barrett.

First Ave., e s Twenty-fifth, s One Hundred and Fifth St., 4 five-st'y brownstone tenements and stores, tin roofs; cost, $16,000; owner, Alice Transmann, 212 East One Hundred and Fifth St.; architects, Babcock & McAvoy.

East Sixteenth St., *Nos.* 525 *and* 527, 2 five-st'y brick tenements, tin roofs; cost, $9,000; owner, Michael Larkin, 350 East Fifteenth St.; architect, Fed. Jewth.

West Forty-seventh St., *No.* 416, five-st'y brick tenement, tin roof; cost, $16,000; owner, Nicholas F. Seebeck, 97 Wall St.; architect, Wm. Grant.

Seventy-eighth St., s s, 94′ w Ave. A, four-st'y brick tenement, tin roof; cost, $15,500; owner, John Warneke, s w cor. Ave. A and Sixty-eighth St.; architect, John Brandt.

Philadelphia.

CHURCH. — *Locust St.*, above Fifteenth St., alteration and addition to Calvary Church; Wilson Bros. & Co., architects.

BUILDING PERMITS. — *Fortieth St.*, n w cor. Eglesfield St., two-st'y stable, 30′ x 75′; Jas. J. Ryan, owner.

Paul St., *No.* 4715, three-st'y dwell., 23′ x 55′; S. W. Evans, Jr.

Moyamensing Ave., 2 three-st'y dwells., 16′ x 55′.

Arch St., *No.* 823, second-st'y addition to brick building, 19′ x 65′; Gilbert & Bacon, owners.

Smedley St., s of Venango St., two st'y dwell., 14′ x 49′; Lucas Hocker, owner.

Simmons St., s of Poplar St., 10 two-st'y dwells., 13′ x 34′; W. H. Bilyeu, owner.

Pulaski Ave., n of Apley St., stable, 24′ x 32′; H. F. Whartman, contractor.

Wayne St., n w cor. Schoolhouse Lane, three-st'y dwell., 40′ x 52′; Wm. Garvin, contractor.

Broad St., n of Lehigh Ave., one-st'y addition to brick building, 28′ x 93′; Beidler & Childs, owners.

Mansion Ave., w of Ripka St., 2 three-st'y dwells., 16′ x 33′; Bukanire, owner.

Woodvale Ave., n of Ridge Ave., three-st'y dwell., 16′ x 30′; J. Lehman, contractor.

Amber St., w of Clearfield St., 2 two-st'y dwells., 13′ x 38′; W. Schoenlabor, contractor.

Erson Ave., *No.* 412, three-st'y dwell., 15′ x 30′; Jno. Kuntz, owner.

North Fifth St., *No.* 932, three-st'y dwell., 19′ x 62′; H. M. Martin, contractor.

Germantown Ave., *No.* 4949, three-st'y warehouse, 21′ x 55′; L. S. Tull, owner.

Humboldt St., *No.* 1026, two-st'y dwell., 16′ x 30′; Jno. Tragebar, owner.

Thompson St., e of Somerset St., two-st'y dwell., 20′ x 46′; Jno. Mitchell, contractor.

Locust St., *No.* 1530, three-st'y brick building, 20′ x 76′; Kemp & Garrison, contractors.

Reed St., n w cor. Mole St., 4 two-st'y dwells., 15′ x 36′; D. Garrison, owner.

South Juniper St., two-st'y addition to stable, 18′ x 40′; J. H. Erickson, contractor.

Broad St., s from Norris St., 16 three-st'y dwells., 14, 17′ x 69; 1, 30′ x 60; 1, 19′ x 60′; also on Norris St., w of Broad St., 5 two-st'y dwells., 16′ x 55′; Jno. M. Sharp, owner.

Arch St., *No.* 732, three-st'y back building, 17′ x 90′, and front alterations; Andrew White.

Jackson St., *No.* 2806, two-st'y store and dwell., 16′ x 45′; W. Mulligan, owner.

Twenty-third St., cor. Ellsworth St., three-st'y store and dwell., 18′ x 54′; J. McGurk, owner.

Salmon St., n w cor. Allegheny Ave., 2 three-st'y dwells., 20′ x 47′, 18′ x 47′; A. M. Linn, contractor.

Ringold St., s of Montgomery Ave., 6 two-st'y dwells., 14′ x 38′; Charles W. Coulson, owner.

Carlisle St., bet. Norris and Diamond Sts., 21 two-st'y dwells., 15′ x 50′.

Broad St., n of Berks St., 4 three-st'y dwells., 18′ x 94′; also on Fountain St., e of Sixteenth St., two-st'y dwell., 13′ x 28′; M. Carey Lee.

Chestnut St., n w cor. Albion St., two-st'y church and school-house, 72′ x 157′; Geo. McNichols, contractor.

Gray's Ferry Road, below Twenty-eighth St., extension and renewal of works, 72′ x 90′; Henry Brown, owner.

Thirty-third St., cor. Willow Grove Ave., three-st'y hotel, 230′ x 250′: also Southampton Ave. w of Germantown Road (Chestnut Hill), three-st'y dwell., 30′ x 30′; W. C. Mackie, contractor.

Fritsch St., s of K St., two-st'y dwell., 15′ x 30′; also on K St., w of Kensington Ave., two-st'y dwell., 14′ x 30′; D. C. Schuler, contractor.

Spruce St., e of Twenty-second St., four-st'y dwell., 25′ x 75′; Chas. W. Budd, contractor.

South St., *No.* 629, three-st'y store and dwell., 14′ x 58′; L. Koder, contractor.

South Fifteenth St., *No.* 134, four-st'y dwell., 16′ x 58′; C. W. Glocker, owner.

Thompson St., n of Hanover St., two-st'y dwell., 48 x 66′; also on Norris St., w of Belgrade St., 2 two-st'y dwells., 16′ x 40′ and 18′ x 50′; J. S. Balat & Son.

Southerland Ave., s of Bainbridge St., two-st'y store-house, 31′ x 34′; H. C. Fox & Son, owners.

Front St., s w cor. Market St., five-st'y store, 25′ x 30′; Jacob Rush, contractor.

Vernon St., *No.* 1710, two-st'y dwell., 15′ x 28′; Wm. Galbraith, owner.

Allegheny Ave., w of Jasper St;, three-st'y dwell., 18′ x 30′; Robt. McFarland, owner.

ALTERATIONS. — *North Thirty-fifth St.*, *No.* 302, alteration and addition to residence of John A. Wilson, Esq.; Wilson Bros. & Co., architects.

South Seventeenth St., *No.* 223, alteration and addition to residence of H. K. Kelley; Wilson Bros. & Co., architects.

St. Louis.

BUILDING PERMITS. — Missouri Gymnastic Society, additional st'y to gymnasium; cost, $5,000; Furleng, architect; R. K. Chasman, contractor.

Charles Cronenbold, brick glue factory; cost, $2,500; Beatie, architect; Thos. Gugerty, contractor.

W. A. Niebling, brick dwell.; cost, $4,000; J. A Niebling, architect and contractor.

B. H. Schwietering, brick dwell.; cost, $3,000; Bisser Bros., contractors.

Albert Voigt, brick dwell.; cost, $4,000; Beinke, architect; C. H. Poetner, contractor.

Jacob Loesch, brick tenement; cost, $4,000; Philip Saurwine, contractor.

W. M. Stinemeyer, double brick tenements; cost, $4,000; Beckimeyer, architect: Charles Wehking, contractor.

Patrick Leahey, 2 adjacent tenements; cost, $4,000; O. W. Bleck, architect; sub-let.

Mrs. Mary E. Fanner, 3 adjacent brick dwells.; cost, $4,500; Rude & Luke, contractors.

Two adjacent brick dwells.; cost, $3,000; Wendelin Roth, contractor.

L. Hannekan, brick store below, rooms above; cost, $3,200; B. Koesters, contractor.

Charles Bauer, brick dwell.; cost, $5,800; H. E. Peipers, architect; J. V. Majors, contractor.

Mrs. Motz, 2 adjacent brick tenements; cost, $2,600; Helm Bros., contractors.

Joseph Grelle, brick tenement; cost, $3,500; Uhri, architect; Jno. W. Frye, contractor.

Wm. Noewry, brick dwell.; cost, $3,200; Dehtmans, architect; Jacob Robinson, contractor.

J. D. Lucas, store and office-building; cost, $80,000; McGrath, architect; B. Weber & Co., contractors.

J. B. Ghio, alteration of dwell. into store; cost, $8,300; Grable, architect; S. C. McCormac, contractor.

Otto Moser, 2 adjacent brick dwells.; cost, $7,300; Jungenfeldt, architect; Chas. Wehking, contractor.

O. T. Madden, 2 adjacent brick dwells.; cost, $4,600; McNarra, architect; Jos. Flanery, contractor.

Wm. Kennedy, 3 adjacent brick dwells.; cost, $8,000; J. D. Fitzgibson, architect and contractor.

St. Louis type foundry, addition to the foundry; cost, $8,000; C. E. Illsley, architect and contractor.

Sharman, brick dwell.; cost, $5,000; W. E. Bent, architect; J. C. Bonsack, contractor.

General Notes.

BATAVIA, O. — Clermont County, O., is to have a brick poor-house, 101′ x 103′; built from plans prepared by S. W. Rogers, architect. It will accommodate 200 persons, and will cost about $30,000. The corner-stone was laid July 26.

BRYN MAWR, PA. — Gardener's cottage, for George Vaux, Esq.; Addison Hutton, architect, Philadelphia.

BURLINGTON, N. J. — Mr. G. A. Todd proposes alteration and addition to his residence, and the erection of a new stable; Wilson Bros. & Co., architects, Philadelphia.

CHAMPAIGN, ILL. — Messrs. Burnham & Root architects, of Chicago, have completed plans for house to be erected for Mr. A. C. Burnham, two-st'y, 60′ x 90′, high roof.

CHICOPEE, MASS. — The River Railroad Company will begin work at once on the brick depot at the Center.

The Belcher & Taylor Agricultural Tool Company have awarded the contract for their new storehouse and blacksmith shop to D. B. Griggs & Son, and work will be begun at once.

CRESTON, IO. — Messrs. Burnham & Root, are architects for the library-building, to be stone basement, and two-st'y, brick.

EPPING, MASS. — The B. W. Hoyt Company proposes to build a new shoe factory, 40′ x 216′.

FINDLAY, O. — Ground has been broken for the foundation of the new college, and the work will now be pushed forward. The main building will be brick with stone trimmings, 162′ front, four-st'y. Mr. M. Rumbaugh, a former Cincinnati architect, is in charge.

HARTFORD, CONN. — The Connecticut Fire Insurance Company will erect at the cor. of Grove and Prospect Sts., a structure 58′ x 120′, one-and-two-st'y high, and in the Byzantine style.

THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT.

No. 15. SATURDAY, AUGUST 4, 1883. VOLUME XIV. No. 397.

THE SAYERS AUTOMATIC VENTILATORS.

THE accompanying illustrations represent the Sayers Automatic Skylight Ventilator. Figure 1 represents the outer face, and Figure 2 a section showing the louvres as closed in high winds and storms. The louvres, as may be seen, are made in a rectangular form, which gives them a double bearing to the wind, and, being hung on axles, the louvres close and open automatically with the varying pressure of the wind, high winds entirely closing the louvres as shown in Figure 2 (see the advertisement of the manufacturers, given on another page, where the louvres are represented in the open position). In order to render this ventilator absolutely weather-proof in driving storms, each louvre is made with a lip at its upper angle, which, with the overlapping edges of the upper louvres when closed, form joints impervious to the heaviest storms. *A*, Figure 2, is the top stop which makes the space over the top louvre weather-proof; *J* is the bottom stop, made with a lip at its upper edge, which is overlapped by the edge of the lower louvre when the latter is closed in a storm; *E E* is a chamber at each end of the ventilator, which makes the joints at the ends of the louvres absolutely storm-proof; these ventilators are also provided with a condensation catch-basin, *F*, so that any dripping that may arise from this cause is carried to the exterior of the building, through the openings *J*, in the rain stop. These ventilators are made of heavy galvanized-iron and constructed in the most durable manner, and being made with a flange running around the face, are used in both metal and wooden skylights; they are also used in stone and brick walls. Where so used they are set in a wood frame built into the wall; they can also be secured by the flange in the board walls of stables and other out-buildings. The many important advantages of the Sayers ventilators are so apparent that they scarcely require to be stated. That they fill a valuable office in the ventilation of buildings is acknowledged by every architect who is familiar with them, and which is abundantly proved by the rapid manner in which they are being put into buildings. The most important advantage of the Sayers ventilators is that they secure the constant ventilation of buildings under all conditions of weather. The serious objections to the use of the swinging sash, with its costly adjusting apparatus, which requires to be closed during changeable and stormy weather, and, through neglect of janitors, is allowed to remain closed the greater part of time, are by use of the Sayers ventilators entirely obviated; being entirely automatic, they do not require attention at any time, and being absolutely storm-proof, they afford perfect security from heavy winds and storms blowing into the building. The Sayers ventilators, being simple, reliable, perfect in operation, and universal in their application, may justly be regarded as the standard of excellence in ventilators, and in every essential point as superior to any ever before presented to the public. The Sayers ventilators are now in extensive use in store windows, skylights, private residences, stables, etc., and are now being put into seven of the public and high schools of Chicago, the St. Patrick Academy and the Lutheran Hospital of the same city. The various forms of these ventilators are supplied to the building trade in all parts of the United States. For other important applications of the Sayers ventilators, particularly the ventilation of store windows, which absolutely prevents freezing of the windows during the most intense frosty weather, see our illustrated catalogue, which is mailed free on application.

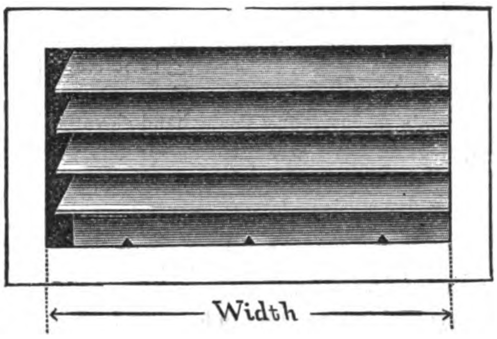


Fig. 1.

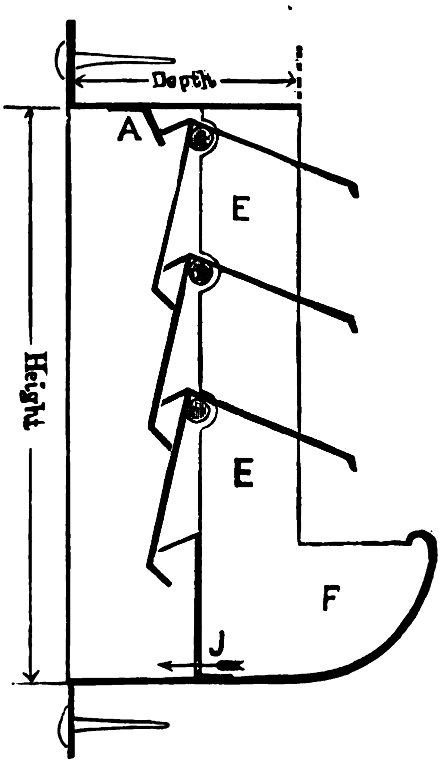


Fig. 2.

W. S. SAYERS & CO.,
113 EAST ADAMS ST., CHICAGO, ILL.

BOSTON'S AMERICAN INDUSTRIAL EXHIBITION.

THE National Exhibition of American Industries and Resources, which will be held in Boston during the coming months of September and October, under the auspices of the New England Manufacturers' and Mechanics' Institute, will be one of the most interesting and instructive exhibitions ever held in New England. The several Southern States and the great railroad systems of the West have been invited to make such displays of their varied resources as will best illustrate the many advantages of those sections, and have an interest to the people of the East. From present indications, the prospect for a large and comprehensive display from these distant sections is very flattering.

Though the South is richly endowed by nature with all those essentials which give wealth and prosperity to a people, circumstances have delayed the utilization of these advantages; but now the field is open to all, and all are invited to seek fortune within her borders. Within the past ten years the South has made much progress in the development of new industries, and the future possibilities of that section are beginning to attract no little attention throughout the world. With the view of bringing these advantages to the notice of home capitalists and manufacturers, and to acquaint the farmer and mechanic with the prospects of the South, the New England Institute has invited the several States to exhibit their resources at the National Exhibition this fall. The South is fully appreciative of this opportunity for advertising herself to the world, and active measures are being taken by the progressive men of the several States to have such displays as will be most interesting to the people of New England. The results of this exhibition will be very beneficial to the people of both sections, North and South. By making a display of these resources, the South will interest capitalists and manufacturers, whose co-operation will give immediate development to the various Southern industries.

Among the States to be represented are North Carolina, South Carolina, Georgia, Ten-

nessee, Mississippi and Louisiana, whose displays of material of all kinds it is impossible here to enumerate. Each State will make a distinct exhibit, which will illustrate the resources of each. Iron, zinc, copper, silver and gold ores; coal and minerals; ornamental marbles, building-stones and granites; large collections of agricultural products, and specimens of valuable forestry, together with samples of manufactured products, will be comprised in the displays from the South. The resources of the West will be largely displayed by the Union Pacific and Missouri Pacific railroads. From the republic of Mexico will also come a large exhibit, demonstrating the mineral and agricultural wealth of that country. General Greenwood, Mayor of the city of Mexico, who lately spent some days in Boston, is very enthusiastic over the subject, and promises to interest himself personally in securing a Mexican display.

While a large portion of the floor-space is to be occupied by exhibits from the South and West, New England manufacturers will also have a goodly representation. With the exhibits from the South there will come hundreds of visitors from these States — men who are engaged in various industrial pursuits, and who are in search of the latest improved machinery for the factory, workshop and farm, and while these Southern buyers are here, let the best of New England's productions be displayed. Machinery of all kinds is in great demand in the South to build, and to develop new industries, and the opportunity now offered should not be neglected by the enterprising manufacturers at home. The liberal policy of the New England Institute, in making no charge for space, and in furnishing season-tickets of admission to exhibitors and assistants without cost, somewhat lessens the expense of exhibiting. Exhibitors are still further favored by the various railroads and express companies, who have kindly agreed to half-rates on all goods shipped to the Exhibition, and, if unsold, to return goods to the original shipper at same rate. This liberal arrangement will also accommodate exhibitors from New York and Pennsylvania.

Parties desiring to take advantage of this valuable opportunity to advertise their goods, or to introduce new inventions and novelties, should make early application, as the first to apply are the first ones to secure space. More than five hundred applications are now on file at the office of the Institute. Further particulars can be had by addressing

JOHN F. WOOD,
Treasurer New England Manufacturers' and Mechanics' Institute,
38 Hawley St., Boston, Mass.

ELEVATORS — THEIR NEED AND USE.

The enormous extent to which machinery is now used in nearly every kind of productive enterprise carried on in this country has had the effect of engaging talent and skill in its improvement. There is no specialty in machinery that has increased in use so much of late years as elevators. Great progress has been made in their shape, gearing and adaptation, and as in other devices and business some few names have a decided reputation for excellence. Among such elevators are the hydraulic elevators of Elias Brewer, whose facilities are of the best for producing any size elevator on the hydraulic system. As many of our readers are perhaps unaware of the advantages of the hydraulic plan over steam, we may enumerate a few.

Water elevators have features which are well worth while for any man who requires an elevator to consider. In the first place it is always ready at any time of day or night, and it is the cheapest machine in the market. You can have any degree of power that you desire without danger of explosion; you can also have any speed you want, and you can go slow or fast; you do away with a fireman and engineer; there is no coal to buy; no delay for repair of boiler and getting up steam; it is always ready, and it is so simple in operation that a little boy eight years old can run it with ease. One advantage of an elevator is that it makes the top floor of your building let more readily than the lower floor on account of its being much lighter. Owners of buildings lose enough rent every year, by the top floor being idle, to pay for one or two elevators.

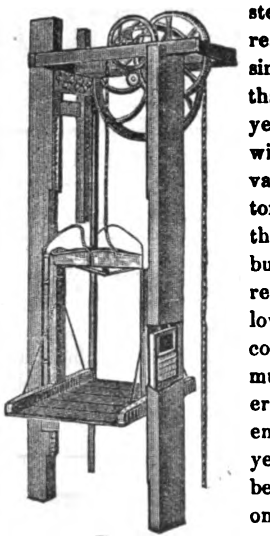


Fig. 1.

The above cut represents a hand elevator, which is in very great demand in all the French flats, hotels, and other small buildings, four or five stories high, to carry up groceries, and coal and wood, and in some places they are made large enough to carry up furniture. It has two brakes, one to brake while descending, and the other to hold the load in any position to keep it from descending, and yet has no interference with the ascension of the elevator, and both are operated by the same check-rope, which is a great feature that very few have yet attained. This new design can be made much cheaper than any other elevator in the market. Another branch of the business which has grown exceedingly of late is the hydraulic dumb-waiter in private residences, to carry food and dishes from the kitchen to the dining-room, which does away with that hard pulling on a rope when you have a large dinner, and all the noise that dumb-waiters usually make. This thing can be started by a little child four years old, either at top or bottom; it runs up itself and is perfectly noiseless. Mr. Brewer has patterns to make them all sizes, and at a very moderate price; and also small elevators to carry up an invalid, at a very low price to suit all classes of people, so that every man that can build a house can afford one of these.

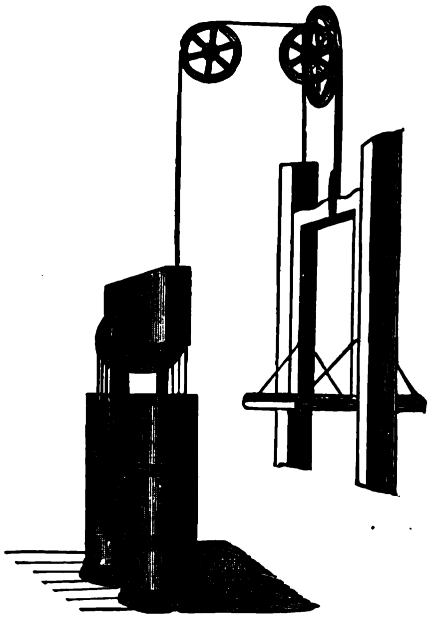


Fig. 2.

Cut No. 2 represents a small hydraulic machine, used for passenger purposes and freight. It has thirty per cent less friction than any other hydraulic elevator machine that is made, and uses thirty per cent less water than any other, on account of its having only one rope, which is of great strength. The car has safety devices which cannot be beaten; and the inventor is willing to stand on the car and cut the rope, to show that it is perfectly safe. The Boston city officials have tested the Brewer safety devices, a record of which tests can be had at the City-Hall, Boston.

The undersigned has United States and Canada patents on inventions of elevators; and also testimonials from all who have purchased and used his make. He is thoroughly practical, and has all the facilities necessary to ensure excellent workmanship and dispatch on all orders. His works are at Chelsea, Mass., or he can be addressed as

ELIAS BREWER,
267 Federal St., Boston, Mass.

IRON BUILDINGS.

Messrs. A. Northrop & Co., of Pittsburgh, the well-known manufacturers of Iron Roofing, have recently been putting up iron ceilings for stores, shops, churches, schools, and public buildings. They are put in in a variety of patterns, and are fast taking the place of old plaster ceilings, as well as being extensively used in new iron buildings.

In cleanliness, fire-proof qualities and strength, and ability to resist injury from jars, blows, water and strains that would injure or destroy a plaster or wood ceiling, the merits of iron need no commendation; while its adaptability to a variety of neat designs, including corners and centre-pieces, will be understood by seeing a few of the patterns made by this firm.

The ceilings are easily put on, and in place of old ceilings it is not necessary to remove the old plaster or wood, thus avoiding the annoyance of dirt and dust from such work.

The inventors make the following claims and assertions.

Plaster ceiling, no matter how cheap, may prove to be the *most expensive ceiling* that can be used, especially in buildings where there is much heavy work on the floors over it, such as the rolling of barrels, tumbling of heavy boxes of goods, or the jarring of machinery; but particularly in halls, churches and school-buildings, where the ceiling is next to the roof. Very few roofs, even if perfect when new, remain perfectly tight for a great length of time, and a small leakage soon loosens the plaster, or stains the frescoing sufficiently to destroy the beauty and value of the ceiling, even if no damage is done by falling plaster. The iron ceiling, painted up in fresco colors, costs no more than a plaster ceiling covered with fresco painting, and presents a far more attractive appearance, while it is not subject to the failures of either plaster or wood ceilings.

Wood ceilings, while not open to the same objections as plaster, are still very objectionable on account of their liability to shrink and to permit dirt to sift through, but more especially on account of their inflammability, while their cost, if put up in the same attractive

manner and shape in which the iron is put on, would exceed the cost of iron. Sheet-iron ceiling is therefore (all things considered) the cheapest as well as the best for use in the class of buildings mentioned.

These ceilings can be hung to the joists ordinarily used for plaster.

They are now in use in the different States, and four car loads have lately been shipped for immediate use in Buffalo, New York.

A. NORTHROP & CO.,
97 FIRST AVE., PITTSBURGH, PA.

NOTES.

THE Yale & Towne Manufacturing Company, Stamford, Conn., have entered into arrangements under which they intend developing the numerous inventions in scales, gauges and testing-machines of Mr. Albert H. Emery, the inventor and designer of the celebrated Government testing-machine in the arsenal at Watertown, Mass. They are at present building three fifty-ton Emery testing-machines.

THE National Exposition of Railway Appliances, lately held at Chicago, awarded to Keuffel & Esser, of 127 Fulton and 42 Ann Sts., New York, four gold and bronze medals.

The only gold medal awarded for surveying, engineering and drawing materials.

The only medal awarded for drawing-tables.

The only medal awarded for engineers' levelling-rods.

The only medal awarded for engineers' railway curves.

THE following appears in the London *Times* of 2d ult. (page 5): The prize jury of the Hygienic Exhibition at Berlin, (Germany) has awarded a gold medal to the Neuchatel Asphalte Company, for exhibits of their manufactures.

BUILDING INTELLIGENCE.

General Notes.

SPRINGFIELD, O.—College-buildings, brick and stone; cost, about $60,000; E. O. Fallis, architect, Toledo, Ohio.

TAUNTON, MASS.—The building of a new school-house on Barnum St., the cost not to exceed $10,000, has been authorized by the city government.

TOLEDO, O.—St. Clair St., near Madison St., five-st'y and basement office-building, brick and stone, 61' x 114'; owners, Messrs. Cummings & Carrington; architect, N. B. Bacon; builder, E. Malone; cost, about $60,000.

Collingwood Ave., frame dwell. for Mr. Cone; cost, about $4,000; Gibbs & Stine, architects.

Plans are being prepared by Gibbs & Stine, for additional city school buildings to the amount of about $15,000.

DYCKERHOFF'S
PORTLAND CEMENT
OF UNRIVALLED STRENGTH, FINENESS AND RELIABILITY,
IS THE BEST AND CHEAPEST
FOR
FOUNDATIONS, CELLARS, SIDEWALKS, FLOORS, ARTIFICIAL STONE,
ETC.

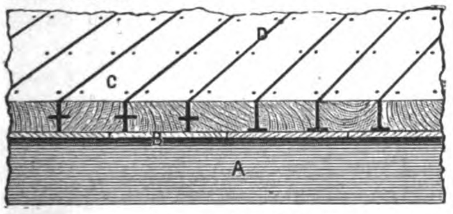
Pamphlet containing Directions and Testimonials sent free.

DYCKERHOFF & SOEHNE, PORTLAND CEMENT WORKS, AMOENEBURG, GERMANY.

E. THIELE, 78 WILLIAM STREET, NEW YORK,
SOLE AGENT FOR THE UNITED STATES.

DOLBEARE'S
Water-Tight Wood Floors.

Architects and Builders will find in Dolbeare's Water-Tight Wood Floors an improvement long sought for, combining lightness, durability, and absolute water-tight qualities. For horse-car, livery, and private stables, it is rapidly taking the place of caulking or concreting. For slaughter-houses, currier's shops, factory floors, bridges, etc., it is highly recommended. In first-class stores, hotels, and public buildings, by the use of this floor it is absolutely impossible for goods or ceilings to be damaged by water leaking through the floor in case of fire, bursting of water-pipes, etc.



Patented June, 1882.

In the above cut an end or sectional view is shown B representing a 7-8 matched boarding on Floor Timber, A, C showing a 3-inch planking with 3-8 Rabbetting or Groving (this can be laid in thickness from 1 inch, upwards), and D showing the Filling in the seams, applied hot, which, when set, is thoroughly adhesive to the wood and sufficiently elastic to allow for any ordinary shrinking, swelling or settling.

Orders respectfully solicited, and personally attended to, by addressing

W. L. DOLBEARE,
Atlantic Avenue, Fort Hill Wharf, Boston.

MIDDLESEX HORSE RAILROAD COMPANY.
BOSTON, June 14, 1882.

W. L. DOLBEARE, Esq.

Dear Sir:—It affords us pleasure to recommend your process for "Making Floors Absolutely Water-Tight." In our new Bunker-Hill Stable, where we have stalls on three floors (one directly over the other), it has given the most perfect satisfaction, and makes no extra strain upon the walls of the building, as would be the case if the old method of "Caulking" was resorted to. In very many respects I regard your floor as very much superior to any caulked floor. Very truly, CHARLES E. POWERS, Pres

SAMUEL D. KELLEY, ARCHITECT.
BOSTON, June 21, 1882.

W. L. DOLBEARE, Esq.

Dear Sir:—I have used Dolbeare's Improved Water-Tight Wood Floors for stable purposes to the extent of about fourteen thousand (14,000) square feet, and they have given complete satisfaction. I consider it superior to caulking or other Improved Water-Tight Floors. Yours, &c.,

SAMUEL D KELLEY.

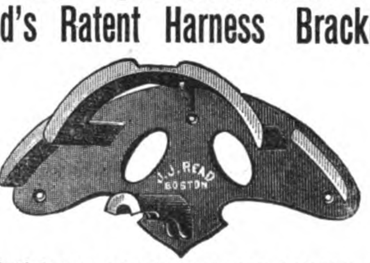
DON'T DRINK DIRTY WATER.

Also Indispensable to Travellers. It is a genuine Filter, and will last for years. Price 50 cents. Mailed free. Price-list to agents on application.

STODDARD LOCK CO.,
104 Reade St., New York.

Something New for the Stable.

Read's Ratent Harness Bracket.



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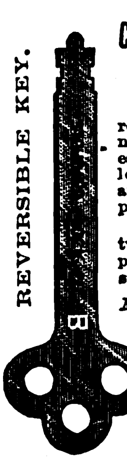

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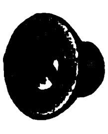

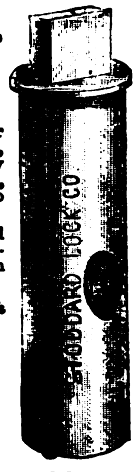

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CONTENTS.

THE concluding portion of the investigation into the conduct of the Supervising Architect's office has brought out some testimony which shows how easy it is, in technical matters, to give an unfavorable construction to circumstances which might bear a very different one. The evidence taken was in relation to the heating apparatus for the Chicago Custom-House, and the first witness examined was a disappointed bidder for the work, whose testimony, "stripped of its technical character," is reported by the New York *Evening Post* to have shown in substance that "the apparatus differed in almost every particular from the requirements of the specifications;" that "the iron was not of the required thickness or quality," "the bolts were smaller and inferior," and the apparatus "was not adequate to warm the building." It turns out, from the testimony of the engineer in charge of the apparatus, that this last fault is due much less to the apparatus than to the building, which is so badly constructed that the cold wind blows in through the ill-fitting frames and sashes; but even this, in the *Evening Post's* opinion, "shows that the building is a bad job."

IT would be more fair for the *Evening Post*, if the building of the Chicago Custom-House is "a bad job," to lay the blame upon the earlier Supervising Architects, under whose care it was constructed, instead of connecting it with the subject of the present investigation. In regard to the heating apparatus, we have in another paper a report of the testimony, not "stripped of technicalities," which to the expert conveys a very different idea of the work from that gathered by the editor of the *Evening Post.* From this it seems that the first fault found by the rival heating contractor was that the boilers had ninety-two tubes, instead of ninety-seven, as specified, which, as he said, reduced their heating capacity, as well as their cost. As the arrangement of tubes is a very nice matter in a large boiler, and too many of them may seriously injure its efficiency, we venture to say that a variation of five per cent in an arbitrary number of tubes is properly within the discretion of a heating engineer, and could not be considered in any sense a violation of his contract unless the variation should be proved, by much better evidence than this, to be an injury. Another criticism made by the witness was that the pipes were "of thinner metal than the specifications called for," and it was only on cross-examination that he admitted that the thin pipes cost more than the thick ones, so that the contractors did more than was required of them in this respect, apparently for the sake of quickness in heating, since all experts know that radiation takes place more rapidly and effectively through a thin pipe. The third accusation was even more trivial than the others. The specifications called for hexagonal nuts to the bolts which secured the flanges of the cast-iron pipes, and inspection showed that square nuts were used instead, making a saving, as the witness estimated, of ten per cent of their value. We imagine that there are few persons who have ever used a monkey-wrench on a small hexagonal nut who would not gladly exchange that form for the square, at the same price, and it is strange to find an accusation of conspiracy based on the substitution, for an inconvenient and unsuitable form of nut, which was probably specified by an accidental slip, of the usual and best kind. In addition to these faults, the same witness found that certain pipes were shorter than the specifications required, and that the tanks in the attic were of a different shape, and of poorer material, than that called for by the contract. Concerning these matters we may suspend judgment, since we cannot tell whether extra radiating surface in one place may not have advantageously replaced that omitted in another, or whether the tanks may not have made up in capacity what they lost by the substitution of tank-iron for boiler iron, and of a square for an angular shape; but it will do no harm to remember that all the changes were authorized by the superintendent in charge of the building, and that some, at least, of them were necessitated by modification in the arrangement of the rooms after the contract was made.

THE telegraph announces the death of a man whom the daily papers call, perhaps with justice, the most distinguished architect in Europe, the Baron Foerstel of Vienna, whose works, including the beautiful votive church of Maximilian, the Museum and the University, gained for him the applause of the artistic world, together with honors such as rarely fall to the lot of architects. He was an honorary member of all the great professional societies, including our own Institute, and enjoyed, if we are not mistaken, the still higher distinction of membership in the Institute of France. His energetic and useful life was a comparatively short one, as he was but fifty-five years of age at the time of his death, but he will long be remembered as one of the most conspicuous figures in the artistic world during the present century.

A GOOD deal of writing is to be seen in the daily papers just now about the dangers of elevators, and of a kind calculated not only to cause unnecessary alarm, but, by its obvious exaggeration to draw the attention of the reasoning part of the public away from the risks which actually exist. It is true that several elevators have recently fallen, and a reporter in New York seems to have hit upon the idea of going about among the elevator manufacturers to learn from each the defects of the machines made by his rivals. It might be expected that a picture made up by such means would be dark, and in the gloomy descriptions given by the manufacturers of each other's devices all gradations of demerit seem to have disappeared. The truth is that, as with other things, elevator safety-catches vary in certainty of action, as well as in thoroughness of construction, and while some kinds are much better than others, the best may fail under unfavorable circumstances. Persons unfamiliar with such apparatus would be surprised to learn how frequently the safety-catches are called into action, to respond, in most cases, with perfect precision; and failure, when it occurs, is quite as likely to often follow from some settlement or derangement of the posts, or from some other accident beyond the manufacturer's control, as through any defect in the apparatus itself. The Springfield *Republican*, in an editorial on the subject, speaks of a trial of an elevator air-cushion in Boston, where the force of the compressed air blew out the side of the tank at the foot of the shaft, as a "disgrace to engineers, who ought to be able to calculate and provide for the force of falling bodies." The fact is, however, that the Boston trial was made upon an elevator running in a shaft partially enclosed in the basement by a plastered stud partition. The engineer, seeing no difference in appearance between this and the brick walls near it, naturally concluded that the whole was brick, but on the fall of the elevator the frail structure gave way. For all that, the resistance which it presented was sufficient to check the motion of a heavy car, falling from a height of eighty or ninety feet, so that the persons in it were not injured. Of many other safety appliances now in constant use the same may be said. They are constructed by the best makers with great care, and thoroughly tested under all the conditions which they can think of, and so far from "usually failing at the crucial moment," they miss their intended effect only in rare instances.

THE *Republican* quotes from a New York paper the queer opinion that "the man who succeeds in solving this problem must abandon outside appliances." "The brake should be managed from within, perhaps by the elevator man himself." As the *Republican* thinks that the inventors of safety appliances "utterly fail to grasp" "the knowledge that a falling body accumulates a momentum," it would be interesting to learn from its superior wisdom what the velocity of a falling car would be, by the time that the boy in it had succeeded, after the parting of the rope, in collecting his wits enough to pull a lever, or apply a brake in some other way. The elevator manufacturers know by experience that the conductor of the car is almost always panic-stricken at the suspicion of an accident, and often brings upon himself the very fate he dreads by his frantic jerks at the shipper rope; and even the coolest man would find difficulty in groping about for and applying a brake within the twentieth of a second or so, after which nothing in the shape of an appliance attached to the car would be of the least avail. It is a little singular that some of the best safety appliances include a provision for dropping the car at will, by a pull on a handle hanging inside, which disconnects the hoisting-rope, and lets the car fall, to be caught by the safety wedges. If the makers of these thought that their inventions would "usually fail" in action, it would be criminal to put such a temptation to use them within the reach of the elevator boy, but in actual practice this device is found of great value in preventing the car, if the operator should lose control of the machinery, from being either drawn up against the top of the shaft or lowered with dangerous speed to the bottom.

A NEW bridge is to cross the Niagara River within a few months, very near the two suspension bridges which already exist. The new bridge, however, is to be of very different construction from either of the old ones, and will possess an unusual interest as being the first example of the modern "cantilever" system to be completed in the United States, although another is now building in British Columbia which will be finished at about the same time. The principle of the cantilever bridges may be illustrated by comparing them with a structure formed of two overhanging beams, projecting toward each other, with a third beam hung between them. Each of the overhanging beams is supported in the middle upon a pier, the weight of the shore end serving to counterbalance that of the end projecting over the river, together with its half of the additional weight of the intermediate beam which hangs between them. Of course, all the beams, instead of solid pieces, are trusses of steel and iron, of such immense transverse strength that two piers only are required in the entire span of eight hundred and ninety-five feet. The first, and only example of this construction yet actually completed, was the ill-fated Tay Bridge in Scotland, but its advantage in point of economy, the bridge being simply built out from each end until the chasm is spanned, is so great as to lead engineers to regard it with much favor, and the Tay Bridge itself is to be rebuilt in the same manner.

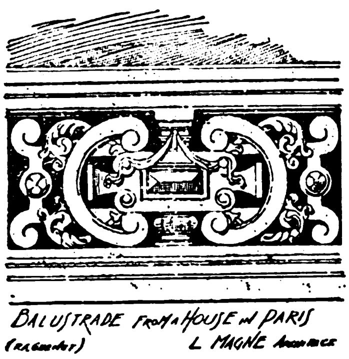
ANOTHER and still more novel form of bridge construction has been suggested for the River Thames. It has long been evident that some better means of crossing that river below London Bridge than is now afforded by the two tunnels must soon be provided, and a great number of plans have been discussed. It is very important to the prosperity of London that the navigation of the Thames, as far as the city, should not be interfered with, and the general opinion seems to be in favor of a high-level bridge in preference to any kind of drawbridge. The City Architect, Mr. Horace Jones, however, proposes a scheme which would, while providing a low-level roadway, do away with many of the disadvantages of the ordinary drawbridges; and even if impracticable in London, the idea may be found available for other places. The proposed bridge, according to the description, would consist of a main span, covered by immense arched girders, rising far above the river, and two side spans, crossed by ordinary trusses. On a level with these, under the arched girder, would be two other straight lattice girders, hinged at the ends nearest the shore, and meeting in the middle, their outer ends being hung by chains from the arched girders overhead. To open the draw it would only be necessary to wind up these chains, which could be quickly done, when the two halves of the draw would rise, leaving a wide, clear waterway between them. This could hardly be called an economical construction in itself, but in the case of the Thames at London a great saving would be made in the cost of the piers and approaches by retaining a low level; while if a draw of any kind is to be used, this, which could easily be made to give a passageway a hundred feet wide for the tallest ships, would be infinitely preferable to the swinging draw, with its huge pier in the midst of the channel, its slow movement, and the narrow passage which, at best, is all that can be obtained through it.

A NEW set of building regulations has been prepared for the city of Berlin, but in order to enable the citizens to bring their minds to them at leisure, they are not to be enforced until next year. As in other places, the problem of lofty buildings, particularly for apartment-houses, has engaged the attention of the authorities, but is solved with a facility hardly possible elsewhere, by the simple process of forbidding absolutely the erection of any structure for dwellings more than seventy-eight feet high; or the renting to tenants of more than five stories in any apartment-house. Most houses in Berlin are built around interior court-yards, and after the new rules go into force no court-yard can be built with a less area than six hundred square feet; nor can the smallest dimension in any case be less than sixteen and one half feet. The present law requires that every dwelling shall have one fire-proof staircase, but this is to be improved upon by providing that in all new houses every floor above the second must be accessible by at least two fire-proof staircases.

THE matter of the second Suez Canal seems to be settled for the present, and it must be confessed that of all the persons concerned in the recent discussion, M. de Lesseps comes out with decidedly the best appearance. On the English side, one hardly knows whether the Prime Minister, standing in an agony of deprecation before Parliament to explain a perfectly reasonable and business-like transaction, or the leader of the opposition, with his blustering inquiry, as if the great French engineer had made the isthmus, instead of the canal, "whether M. de Lesseps had the right to intercept the traffic between two seas," presents the more pitiable spectacle; and it is pleasant to turn from the account of the proceedings at Westminster to the quiet common-sense of the persons most interested on the other side of the Channel. After conceding everything that could reasonably be asked of the company in the original contract with the English Government, M. de Lesseps, observing, no doubt with sincere astonishment, the commotion raised in England over the transaction, has, with the utmost courtesy and good feeling, written to Mr. Gladstone to beg him, in the interest of national friendship, not to consider himself bound in any way to carry out the agreement, or even to press it upon the notice of Parliament; saying also that the Canal Company will find elsewhere the money which the British Government had promised to lend it, and proceed at once to complete the second canal; and will, moreover, when it is finished, carry out the same stipulations in regard to a reduction of dues that were promised in the contract. What more than this could be expected of the "obstructer of the passage between two seas," it is difficult to imagine.

A VERY gratifying statement is made to the Government in regard to the present condition of the channel at the Mississippi jetties, concerning which we have had so much conflicting testimony. According to the inspecting officer, there is now a continuous channel from the river proper to the Gulf of Mexico, having a minimum depth of twenty-six feet, and a width of one hundred and sixty feet at the narrowest place. Between the jetties themselves is a channel ninety feet wide, and varying from thirty to thirty-one feet in depth, while at the head of the South Pass the thirty-foot channel is four hundred feet wide. The unimproved passes seem to be gradually closing up, the bar at the mouth of the Southwest Pass having only a twelve-foot channel through it, while the Pass à l' Outre is inaccessible for any vessel drawing more than eight feet of water. The main object of the jetties seems to have been fulfilled, in the gradual improvement of the entire South Pass by the action of the river; the general depth and width of the channel having decidedly increased.

FROM BAYREUTH TO RATISBON.—NOTES OF A HASTY TRIP[1].—XII.


BALUSTRADE FROM A HOUSE IN PARIS
(FRAGMENT) L MAGNE ARCHITECT

ON the road from Munich to Ratisbon we pass at least two towns where it would be more than worth one's while to stop. One is Schleissheim — so near Munich, by the way, that it can well be taken in an afternoon's excursion — where there is a splendid Renaissance palace and a large collection of fine old pictures. The other is Landshut, a small town lying in an open country but at the foot of wooded hills. It is full of monuments of earlier periods but its great attraction is the Martinskirche — which is one of the finest extant examples of brick building in all Germany, begun in 1492 and finished about a century later, its architect being Hanns Stethaimer von Burghausen, to whom are also credited many excellent works in other Bavarian cities. It is a large *Hallenkirche,* said to be finished with a greater wealth and nicety of detail than most of the brick churches in the neighborhood; but its great glory is its extremely bold and lofty spire, which measures four hundred and forty-three feet, and is therefore exceeded in height by less than half a dozen existing spires, whether old or new. Even from the railroad it is very striking and, apparently, very well proportioned — seeming all the taller, rising as it does from the flat plain and in the midst of only a little city; but we had no time to give to its examination, barely enough being left of our holiday to grant us a glimpse of the greater marvels of Ratisbon.

And a marvellous place it is indeed. Full as all these German towns are of historical mementoes, far back as goes the mystery of most of them, and crowded as this history is with picturesque events and famous figures, the life of most seems short and barren if compared with that of Ratisbon. Nowhere in Germany is historical knowledge more important if the student would taste the full flavor of the spot. Nowhere else are the monuments of all ages so entwined with human life-histories, or mixed together in a confusion so inextricable to him who is not an expert in the traces of architectural styles and in the dates and names of times gone by. Furnished with such information weeks might be spent in Ratisbon with ever growing delight and ever growing knowledge; but only a typical German *Historiker* could be expected to have his material all at his finger's end in such a place. Even the exceptionally well instructed foreigner will find that he knows only just enough to perceive the main outlines of Ratisbon's history, and the average tourist must resign himself to studying most of the monuments for their own intrinsic sakes alone. Even thus he will have plenty to occupy and to attract him. I know of no one city in Germany where a student might better come than here to see traces of every building epoch from the days of the Romans to our own. Few examples, perhaps, are of the highest possible artistic order, but many of them are most beautiful; all are very interesting; we get fragments of very early periods such as are hardly to be found elsewhere; and perhaps the most instructive lesson of all is found in the noting the way all times and styles are mixed and mingled together, showing that in its days of truest life architecture was a living useful art, which its builders bent to their immediate purposes and needs, caring little for the intact preservation of older monuments, but caring still less to destroy or renovate these in order that the result might be all of a piece. What was good enough to use they left as it was, and the new was built in the fashion of the day with no thought of unity or even harmony. Of course this is a truism and can be proved from almost any European city; but I never saw it so fully, so convincingly proved, or with so many diverse elements as here. The aspect of the town is very different from that of Würzburg, which I have described as being a striking architectural medley. It shows profuse remains of much earlier days than those which are prominent in Würzburg, and these give its general character to the town, while at Würzburg the general character is given by the seventeenth and eighteenth century buildings which so abound. These are not absent in Ratisbon but are inconspicuous. Much as later builders have done to the city its general effect is in many streets probably more nearly that presented by a town in late Romanesque or early Gothic days than we could easily find elsewhere. I may add that one is fortunately able to supplement one's own lacking historical knowledge by means of a good local hand-book written by Count von Waldersdorff, and his volume is still more useful as a guide amid the labyrinths of Ratisbon's antiquities. Architectural students seem to have been rare in the place, for no one is able to give a very clear direction as to where to find the chief objects of interest — still less to suggest what these may be. Without enough knowledge of German to follow the learned Count's clear little book the traveller must be lost indeed in such a town as this.

Curiously enough the foreign name of the city — Ratisbon in English and something similar in every other language except German — is its oldest historical appellation. It was called *Radasbona* by its first, apparently Celtic, founders. Adjoining it the Romans built a camp which they called *Regina Castra.* This appellation has been turned into the German *Regensburg* — probably because the original town was destroyed in the barbarian inroads and the newer one grew up around the Roman site. Marcus Aurelius is mentioned as having repaired the fortifications of this last, and from his day to our own there are few years when history has not something to tell us of Ratisbon. In the seventh century the body of the martyred missionary St. Emmeran was buried here and one of the chief churches still bears his name. Charles the Great is a familiar name in local chronicles; and the last of his German descendants, Lewis the Child, died here in 911 and was also buried in the church of St. Emmeran. Not a local duke, not a German emperor of later days but sojourned here, or fought, or sat in council, or was in some way bound up with Ratisbon's life. Henry II, whom we already know as the founder of Bamberg, was as active here in the far south, richly endowing the cathedral. The crusaders passed through more than once. It became one of the foremost of the free imperial towns and the favorite place, as every one knows, for holding great imperial assemblies — the *Reichstags* of those days. Many an emperor was here elected, many a one here crowned or married. And when we come down to the Napoleonic wars it is the same thing — Ratisbon is always coming to the front, always playing a part of great importance as the chosen seat or assembling place of the powers that have been or that are. Only in the present century, since the city's independence has been lost, and it has become merely one among the many towns of Bavaria, does the lively picturesque chronicle cease. To-day the place is quiet enough. It is hard to believe it was the very centre of aristocratic military life in Southern Germany for so many years. It was Sunday when we arrived and we walked through the chief streets, to find them, it is true, well filled with people; but it was a curiously provincial looking crowd. No one seemed above the rank of peasant or small provincial. There was not a sign of wealth or of enterprise, still less of aristocratic life.

Ratisbon is off the highway of commerce to-day and has no university to keep it alive like Würzburg. It was the beloved town of princes and kaisers and we see how entirely it owed its importance to them, seeing how entirely it has died into obscurity now that their days are practically over. In my introductory chapter I said, I think, that Ratisbon looked like a sulky discrowned monarch, and I know of no better illustration. The narrow, gloomy streets, the old, old houses which, though color-washed and modernized as far as possible, still look stern and mediæval enough with their small windows and their great round-arched doorways, would need a far brighter population than that of to-day to enliven them. I don't doubt the town once looked gay and brilliant enough, but to-day it is as gloomy looking as one well can picture. It has not the dull placid deadness of provincial towns which have not a very brilliant past behind them. It seems, I repeat, distinctly, almost oppressively sulky, brooding, and dispiriting to the visitor. All the gay pictures his imagination calls up but serve to increase the dismal effect of the present. There is a sort of banquet-hall-deserted look about Ratisbon unequalled in any other town I have ever seen which is not in the least ruined or fallen into material decay. But this the student will soon forget when he comes to examine its treasures in detail. Or perhaps, like ourselves, he will delight in it, preferring the fine historical flavor of the depression of spirit it induces, to the commonplace jollity he may feel in more cheerful, more modern towns. Perhaps I am insisting too much on generalities, but it is because this general effect of Ratisbon is one of the most interesting of its qualities. It has a stronger individuality, a more peculiar local color, so to say, than any town I know. It casts its own mood over the visitor so instantly, transports him so entirely into a past age or into sentimental regrets at the disappearance of that age, that he can hardly believe that twelve hours ago he was in the hideous, but cheerful, crowded, cosmopolitan streets of Munich. To live in Ratisbon would be the most awful of fates — to stay there a few days and let the grave-like historical aroma of the place possess one's soul, would be an experience worth the getting. It is the tomb of the old German Empire, and gives one much the same feeling that is given by some splendid mortuary chapel fallen into oblivion and neglect. The royalties are dead —that is depressing enough; but no one cares whether they are dead or not, and that is worse. No one thinks of them or looks at their relics but ourselves; the outside world goes on its merry way quite unconcerned. This is something the feeling we have in Ratisbon, where we did not see a single foreign tourist, and where we felt, in trying to study its monuments, a little as though we were prying into desecrated sepulchres.

Our hotel stood in an irregularly shaped little square into which streets ran at every angle. It was the same old *Goldenes Kreuz* where Charles the Fifth was wont to stop, and where in 1547 his famous son, Don John of Austria, was born to the daughter of his host — all of which is duly related in a curious poetical inscription painted on the front of the house. From this square we start to seek first the cathedral. Our way takes us along a very narrow street bordered by tall houses portions of which at least are of great antiquity. The name of the street is *Zum Goliath* and comes from an immense fresco of the giant Goliath which covers the front of one of its houses. The weatherworn relics we see to-day are from a modern hand, but the original painting is said to have been executed in 1573 by a painter named Bocksberger who decorated the Rath-Haus and St. Emmeran.

The Cathedral stands on a square and is lifted on a high foundation

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[1] Continued from page 40, No. 396.

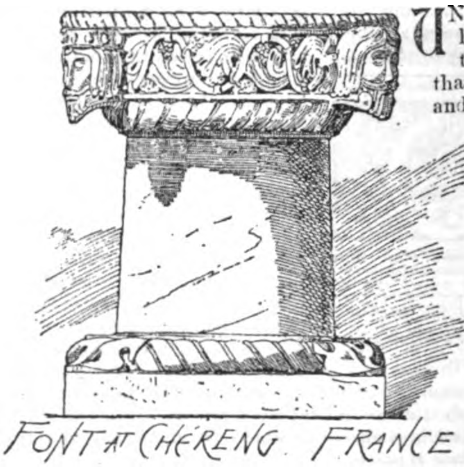
in the most fortunate manner. All its sides save the north can be seen well from the street and the latter from a garden which contains the ruins of cloisters and older structures mixed together in the most confusing manner. The west front is too well known to need description. Its faults of design — its multitude of small features and lack of dominant motive or emphasis — are even more apparent, however, when we are in face of it than when we study reproductions. The present structure was begun in 1273, and to this century belongs the apse with its immense windows. The southern side dates from the fourteenth century, but the façade only from the fifteenth, not having been completed, indeed, till after the year 1500. The great towers are the work of our own generation, having been completed in 1871 after old designs. They are in such perfect harmony with the older portions, not only in form and detail but already in color, that it is with difficulty we realize their newness. I know of no modern addition to an ancient church which seems so perfectly satisfactory as these towers at Ratisbon. If the west front were equal in design to the rest of the building few churches in all Germany could surpass it. Even here some of the details are charming in themselves and I must not forget to mention the porch, which is too small for the façade, but with its triangular plan and double entrance arches is very lovely. It is the interior, however, for which one cares the most. Strictly judged, — by the standard, for example, of the most perfect French churches, — it has faults and deficiencies not a few. It is criticised for its proportions as well as for its details by more than one writer, but the fact remains that it is among the most delightful and poetical of buildings. Its pictorial charm is perhaps its greatest title to admiration. As in the Lorenzkirche of Nuremberg, the paintér and the lover of the picturesque in architecture will be more enthusiastic perhaps than the purely professional student. The color of the interior is marvellously warm and mellow, and it has apparently never suffered much at the hands of the restorer. The light is very rich and the glass windows, though not absolutely of the finest periods, have, taking their number with their beauty, no equals in South Germany. The nave is almost as wide as that of Cologne though much less long. Each aisle ends in a polygonal chapel, and is not continued around the choir. The transepts have no projection beyond the walls of the aisles. These arrangements, together with the fact that the height of the nave is not great, judged by that of French examples, combine to give an expression of breadth as opposed to height or length which is the chief fault found with the building by the purists. But it is only the purists, I think, who feel justified in cavilling. The triforium and clerestory are finely designed. The windows of the latter are very spacious and some of their ancient glass is still in place. The lack of a good west window is felt, however, as much inside the church as out, and the smaller ones which take its place are filled with vile modern glass which looks for all the world like an old-fashioned ingrain carpet in crude tones of green and red, and yellow. This, however, is but a small blot, and when our eyes have once found the apse which, together with the clerestory windows of the transepts, contains most of the old glass, we forget all faults that may exist in other portions of the structure. The apse is five-sided and the three wide central divisions are simply open walls of tracery and glass with no solid spaces whatsoever. The design does not show the usual unbroken tall lights, but a succession of three rows placed one over the other. That is to say, we have first, broad square-headed openings to which the tracery gives the pointed form; above these comes a narrow gallery — a triforium, so to speak — of many little arches also filled with glass, and above this again, great pointed openings or clerestory lights. It is a most fortunate arrangement when we remember that the breadth of the walls is very great as compared with their height. No plain spaces of wall are introduced and yet architectural stability of appearance is secured. To further enhance this the lower range of windows is set back a little in niches the fronts of which are filled with open tracery. The upper, or clerestory, range of lights is continued along the side walls of the choir, thus uniting it admirably with the open lightness of the apse itself. The glass, as I have said, is not of the very best period; it has not the deep gorgeousness of Chartres or of the roses in the transepts at Cologne. But it is true stained and not painted glass and is largely from the first half of the fourteenth century when design was still good, and color, though lighter in tone and less striking than before, was still exquisite in beauty and harmony. Some of the side windows in the choir are not perfect in color, a rather disagreeable dark blue being prominent. But the aisle chapels show some exquisite pieces of *grisaille* work, and the apse is, I repeat, quite perfect in its way — all its glazing being, I believe, of the fourteenth century. A more enchanting piece of art work, a more impressive, a more bewilderingly fascinating I have never seen. One lost the thought of how it had been executed, by masons and glass-workers with mere brute materials, and gazed at it as at some marvellous, unexplained vision in which human hands could have played no creative part.

M. G. van Rensselaer.

Old Bells from Cuba. — The brigantine *Julia Blake* has discharged at Dickinson Street wharf a number of curious old bells which have been cracked in the service of the Catholic Church on the island of Cuba. Every year about this season these old and useless bells, many of them cast hundreds of years ago in Italy and Spain, are collected in Cuba by a gentleman doing business with Philadelphia, and shipped here to be disposed of at the market rates for old bronze. Many of the bells are fine specimens of the best workmanship of Europe's oldest and most celebrated foundries. — *Philadelphia Record.*

WATER-CLOSETS.[1] — XVI.

HOPPER-CLOSETS.



UNDER this heading I have thought it best to group all closets that have a simple bowl and no mechanical device other than a water-seal between them and the soil-pipe. (Article IV, No. 373.)

This branch of the subject may with advantage be treated under the two types of long and short hopper-closets.

The long hopper is connected with a trap which is placed beneath the floor, while the short hoppers have their trap, which is often formed in one piece with the bowl, placed above the floor.

Long Hopper-Closets. — This type of closet being apparently the simplest form, we would naturally expect to find it the earliest kind put into use, but although this may have been the case there is no evidence to that effect; and if it was so, it was considered until recent years too simple to put on record.

The opportunity for invention in this class is limited to the shape of the closet, the shape and position of its water-supply device and flushing-rim, or to the manner adopted for ventilating it.

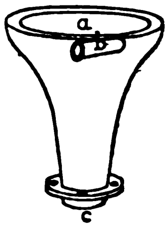


Fig. 159.
Philadelphia Hopper.

Long hopper-closets are manufactured by all the firms making plumbers' supplies, and may be obtained of iron, plain, painted or enamelled, as well as in solid earthenware or porcelain.

The most common form is what is called the Philadelphia hopper. This has a bowl at the top, which suddenly changes to a diameter about the size of the soil-pipe. This closet is the cheapest and most objectionable form of its class. The sides are liable to become foul, the water being introduced in such a way that it can only flow around the bowl in a stream insufficient either to cleanse the sides of the bowl, or to empty the trap properly. The trap is connected with the bowl just below the floor line.

Foley's Closet.—A good type of an improved form of long hopper-closet was invented in 1883, by J. Foley. This closet as well as other better forms of the class are straight or nearly so at the back, so fæcal matter will drop directly into the mouth of the trap. The water-supply is conducted through an annular branch, formed in one piece of earthenware with the bowl. This conductor extends about half-way around the top of the bowl. The water is admitted to the bowl through three openings, one being at the back and one on each side. The water is distributed over the surface of the bowl by means of fans, instead of a flushing-rim, as is the case in other closets of its form. I think a good flushing-rim washes the bowl more thoroughly than any arrangement of fans.

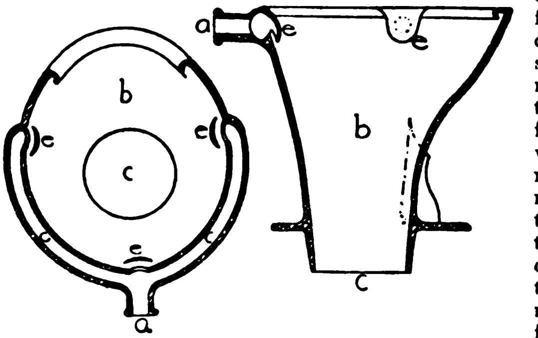


Fig. 160. Foley's Closet. Fig. 161.

a, Inlet for water. *b*, Bowl. *c*, Outlet. *e*, Fans.

Demarest Long Hopper. — The long hopper-closet furnished under this name by J. L. Mott & Co., is either round or oval in shape, and has one of Demarest's patent flushing-rims, the same that is used on the Hygeia closet (Fig. 138). This is in one piece of earthenware, and forms a very neat and effective closet when supplied, as it is intended to be, by a tank or cistern.

Fig. 162.
The Niagara Closet.

a, Bowl. *b*, Outlet.
c, Flushing-rim.

Myers's Niagara Closet. — A. G. Myers, of New York, manufactures a closet of this type and class. This hopper has Myers's patent zigzag flushing-rim, described in connection with the same firm's "All China Closet" (Fig. 155). It is useless to enumerate the many different closets which are

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[1] Continued from page 28, No. 395.

similar to the ones named. All the prominent firms in England and America manufacture closets which vary from the ones illustrated only in the mode of flushing, or in a slight variation in their form. The long hopper-closet is the best form for exposed situations, where it is necessary to place the trap some distance below ground, according to the severity of the climate. It is necessary in a case of this kind to have the supply-cock placed at the same distance below the surface, opening it by means of a long key or rod.

Maddock's "Wash-Out" Closet. — The Maddock's "Wash-Out" closet is of the long hopper class, and has a projecting lip formed on the upper and front part of the rim, to better adapt it for use as a urinal.

Fig. 163.

Maddock's Hopper.

a, Bowl.
b, Flushing-rim.
d, Outlet.
e, Projecting lip.

Rhoads's Closet. — The Rhoads long hopper-closet was invented in this country in the year 1877. This closet is intended to be used without either a wooden casing or seat, in this manner avoiding the accumulation of, or collections of filth on, in, or behind the wood-work. A closet arranged in this manner is excellent for use in hospitals and prisons. In the first case the wood-work might absorb and communicate infectious diseases, in the latter case the wood-work would become foul from careless usage.

A large number of this form of hopper-closets have vent-pipes attached to the lower part of the hopper just before it is connected with the soil-pipe or trap. Among closets with the vent, may be mentioned the "Worcester" closet, and I have been informed by Mr. O. W. Norcross, that it was in use in the city from which it takes its name a number of years previous to the year 1876. This and a vented closet invented by R. D. O. Smith, of Washington, D. C., are described by Prof. Clark in his articles on "Modern Plumbing" (*American Architect*, 1878, No. 140). In these closets the arrangement of the vent is for the same purpose, and in principle they seem to be identical. The receiver is a decided objection in the Smith closet, acting as a collector of filth: it is almost as objectionable as a receiver under a pan-closet.

The intention was to use these closets without a trap, in which case the vent near the soil-pipe, as in the Worcester closet, would be advantageous; but they are also intended to act as a vent for the room: for this purpose the Smith closet would have a slight advantage.

Fig. 164.

Rhoads's Hopper.

a, Bowl.
b, Supply.
c, Seat and flushing-rim.
d, Outlet.

The Philips Closet. — In 1882, a closet was invented which is a combination of the Worcester and Smith closets. The bowl is formed separately to set into a small hopper. The vent-pipe starts near the floor, runs along the side of the hopper, and has an opening into it near the bottom of the bowl. This closet instead of having a metal hopper into which the bowl is set with the same objectionable putty-joint described in connection with the pan-closets, has the bowl-hopper and vent-pipe made in one piece of earthenware.

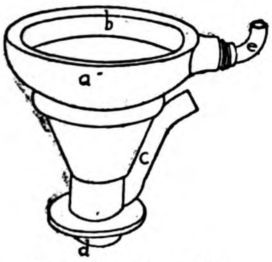

Fig. 165. — Perspective.

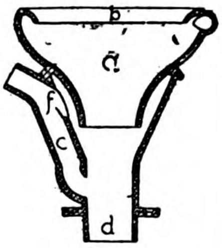

Fig. 166. — Section.

Philips Closet.

a, Bowl. *b*, Flushing-rim. *c*, Vent-pipe. *d*, Outlet. *e*, Supply-coupling. *f*, Upper opening into vent-pipe.

Watson's Closet. — Another closet of this kind, designed by Watson, is so arranged, by curving the outlet from the bowl, that the trap and its contents will be out of sight. This closet has a vent or a socket for a vent-pipe just before it joins the trap or soil-pipe. The bowls of this closet are made oval or square, and are much larger than this portion of the closet usually is. They can thus be used as slop-hoppers or urinals to better advantage than if the bowl were small.

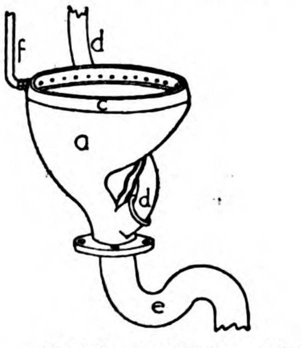

Fig. 167. — Oval Bowl.

Fig. 168. — Square Bowl.

Watson's Closet.

a, Bowl. *b*, Vent. *c*, Flushing-rim. *e*, Trap. *f*, Supply.

There is no objection to using a vent-pipe in the position shown in the preceding closets; and it might be found advantageous in taking off odors from the room, or odors created while some one was at stool. It must be remembered that a vent-pipe can never be a substitute for a proper siphon-trap under the closet. Patentees sometimes claim that there is no further necessity for a trap, as the vent-pipe opening into a hot flue would carry off all noxious gases generated in what Mr. Eardley F. Bailey-Denton[1] properly calls the inside sewerage system of the house.

The purpose which a vent-pipe of this kind is intended to fulfil — to carry off odors from the closet bowl or room — would be better served by an annular ring with slots in it, extending around the top of the bowl, and connected with some heated flue or pipe, and made either of metal separate from the closet, or of earthenware formed in one piece with the bowl.

Fowler's Closet. — Baldwin Latham describes a novel form of long hopper-closet in the one designed by Fowler. The novelty in this closet consists in the trap being connected with the drain-pipe from the yard, sink, wash-basin, or other fixture.

In this manner only waste-water could be used in washing matter from the trap. Under some circumstances in villages or country places a closet of this kind might be found useful. I consider the better long hopper-closets preferable to any other class or form, except the short hopper, and there are only two reasons why the short hopper is to be preferred. It has less distance between the bowl and trap, and thus less surface to become foul.

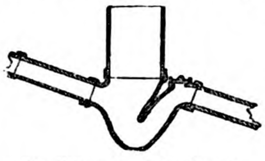

Fig. 169. — Fowler's Closet.

a, Hopper. *b*, Trap. *c*. Drain. *d*, Inspection-cover.

It appears to have been conclusively proved by the experiments of Messrs. Edw. S. Philbrick and E. W. Bowditch made under the auspices of the National Board of Health[2] (see *American Architect*, No. 350, 1882, p. 123), that the momentum of the water created by the distance between the top of the bowl, and the water in the trap was sufficient to force sufficient water out of the trap to break the seal. The vent-pipe (2") seems to have very little effect in preventing loss of seal by momentum, which must not be mistaken for siphon action. So it can be seen that a closet of this kind might lose its water-seal, and the party using it be none the wiser. The trap is such a distance from the closet seat, that it is impossible to see whether the trap has lost its seal or not.

THE SEWERAGE OF PARIS.—I.

ENCYCLOPÉDIE D'ARCHITECTURE

TOMB OF THEODORE BARRIERE. — CEMETERY PERE-LACHAISE PARIS A. MAGNE. ARCHT

AN important technical commission has been employed during the past year in considering the best manner for relieving the city of Paris of its renowned odors — odors which prevail not only in the public streets, but almost universally within houses of all classes. The projects under investigation are of two classes: one proposing the entire removal of fæcal matter and household and industrial wastes by sewers (*tout à l'égout*); the other proposing the emptying of vaults and cesspools by improved processes, or the removal, by the Berlier or Liernur systems, of foul wastes only, conveying these to suitable points without the city, and then converting their organic contents into artificial products, to be used for agricultural or chemical purposes. At present every house has its cesspool or vault, in which all waste organic matter is retained for long periods, during which its fermentation acts as a source of great contamination of the air, and, presumably, of a serious infection, originating epidemics of typhoid fever and other zymotic diseases. The Liernur system of daily removal by

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[1] A Hand-book of House Sanitation: Eardley F. Bailey-Denton, London, 1882.
[2] Also in *Sanitary Engineer*.

pneumatic process would withhold from the vaults the solid matters of kitchen waste, and the total products of the water-closet, leaving the liquid kitchen wastes to flow to the present sewers. The Berlier system would remove all household wastes, but the solid portions only after they had, through putrefaction, assumed a liquid form.

The discharge of all wastes directly to the sewers would lead to the entire suppression of vaults, cesspools, and other seats of deposit within the habitation. This complete removal receives the approval of the best authorities on the subject; but in Paris it is met with the difficulty that most of the sewers — all except the large collecting sewers — are so large, and carry such limited flow, as to cause deposits and local putrefaction, which would only transfer to the sewer and to the street the offensiveness now originating in the house and in the cesspool. There is the further difficulty that only a relatively small portion of the rapidly growing city is now provided with sewers of any sort: a recent report of the Director of Works estimates the length of unsewered streets at about 220 miles, requiring for construction, if the existing system should be extended, an outlay of seven million dollars.

These facts are now being carefully considered and discussed by the Technical Commission, which has ordered the trial, on an extensive scale, of the system of sewerage carried out in Memphis. The latest feature of the discussion, which has been going on actively since November last, is a paper submitted by M. Vauthier, a member of the Commission, and also of the Municipal Council of Paris, read on the 28th of March, 1883, before the first Sub-Commission. Of this paper we furnish the following translation: —

The exposition[1] made by M. Poutzen, C. E., on the 10th of last January before the Second Sub-Commission, on the subject of the system of removing water-closet matters and household wastes, that Mr. Waring applied for the first time in the city of Memphis, United States, seems to offer a new solution of the question of the sanitary improvement of Paris (*de l'assainissement de Paris*).

The greatest difficulties that arise, not only from the universal discharge of water-closet matter into the sewers, but henceforth, also, in connection with the maintenance of the sewers in a proper state of cleanliness, seem to relate chiefly to the *primary* sewers of the system; that is, to those which begin in the streets in which they lie, and which M. Humblot, Engineer-in-Chief, calls the *direct* sewers. According to the ideas and mode of construction followed up to this time in Paris, these direct primary sewers are always of rather large dimensions. The invert has a width always of 40 centimetres, and lately we have had occasion to see, in a number of sewerage projects submitted to the Municipal Council, that the tendency is rather to augment than to diminish the size. In a great number of these projects for primary sewers or for sub-main sewers having the same character, the original "Type 12" has been supplanted by "Type 13," which carries the invert from 40 centimetres to 50 centimetres (16 inches to 20 inches).

This tendency is understood if we consider the notion which has thus far controlled the establishment of large sewers (*galeries d'égout*). Indeed it seems to be economical reasons only that have prevented a further enlargement. These sewers are convenient subterranean passageways, where the hand of man is considered an indispensable auxiliary to cleansing, and where there may be placed the bundles of wires for telegraphs, telephones, etc., and pipes for the supply of water. For a long time the house branches have been constructed according to the same ideas, being intended to be utilized as passageways in the emptying of vaults, etc.

But the better these primary sewers satisfy the *desiderata* in view of which they have been constructed, the less are they adapted to receive, without inconvenience, fæcal matter and household wastes.

The water used in washing the public streets — the only water on which we can depend for cleaning the sewers, in view of the intermittent character of the rain-fall — produces only a momentary current. Some portions of the sewers indeed escape even this street water and the rain-water—those parts which are above the first inlet of the sewer, when this is inclined in the same direction as the street, as is most frequently the case. It would doubtless be possible, by delivering water into the sewer which had been used for washing the gutters, to remove this last objection; but if it were proposed to change the present intermittent current to a continuous one, we should be obliged either to employ an exaggerated amount of water, or we should secure only an insignificant current.

This vice of the primary sewers has already struck everybody. It has been proposed to correct it by establishing a reservoir at the head of each sewer; but we are always met by the objection stated above: either we must use a great amount of water with this special object, or we shall have but an insufficient palliative.

The defect indicated is fundamental. It depends essentially on the fact that the primary sewers are intended, as are the others, for passageways for workmen — not only as channels for the removal of water. The invert is too large, and it is in vain to reduce it by adopting, as at Brussels and in London, the oval form. This would only render walking more difficult, without essentially ameliorating the conditions of the flow of water.

The fact cannot be disguised: in the primary sewers there is a contradiction between the two functions. It is impossible that sewers of the Types 12 and 13, for instance, having, so far as current is concerned, to depend on their own supply, should not retain in their inverts, whatever may be their inclination, all or much of the substances delivered to them by private drains. The difficulty is augmented if through the inlets these sewers receive sand and other heavy detritus from the public streets. The best plan is, when one is confronted with a system that is fundamentally defective, to change it completely rather than to attempt by ingenious devices to correct it.

What has just been said of these primary sewers is applicable, with more force, to private drains.

Hear what M. Humblot, Engineer-in-Chief, says in his exposition of the 15th of December, before the First Sub-Commission: —

"On leaving the house," he says, "we find the private branch drain leading to the public sewer the waters of the property.

"In these branch drains the outlet-pipe generally ends at the exterior line of the property, and terminates in an hydraulic trap which cuts off all communication between the air of the sewer and that of the house.

"Sometimes the pipe is extended to the junction of the private branch with the public sewer.

"Under the first arrangement the house waters soil the invert of the branch drain; and when the quantity of water and the inclination are insufficient, they deposit ordure which gives out offensive odors. We may imagine," says M. Humblot in passing, "how great would be the infection if *fæcal* matters were thus arrested.

"Under the second arrangement the pipes are often obstructed, especially when their inclinations are slight and their outlets subject to periodic or almost constant submersion by the waters of the sewer, which often deposit solid matter in the mouth of the pipe. The workmen employed by house-owners to remove these obstructions often succeed in doing so only by breaking the pipes. This difficulty, which is rare," M. Humblot finally says, "in sewers deep enough to allow the house-drain to reach them with a steep fall, is almost inevitable in those central districts where the inverts of the sewers of the old type are at little depth below the surface of the street; in these central quarters the outlet pipes generally stop at the side of the house."

So far as private drains are concerned, we have nothing to add to these suggestions. Let us remember only the circumstance that the hydraulic traps have to be broken to effect their cleaning. This is one of the objections to complicated apparatus, and this complication is made imperative by the need for withholding from the house the vitiated air of the sewers.

We might stop our citation here, but it will not be without use to follow M. Humblot a little farther. He goes on, in the apprehension with which the delivery of fæcal matter into the sewers inspires him, to confirm, with regard to the primary sewers, what we have already expressed.

"Now we see," he says, "these matters delivered into the public sewer. If this is a direct sewer, that is to say, beginning in the street in which it is laid — and this is the case for more than one-half of the sewers — it generally receives only the water of the houses, for its inclination is almost always in the direction of the inclination of the street, and the water used for washing the gutters only reaches the sewer at its lower end. Also, when there are no industrial establishments on the street, such as laundries, baths, etc., the volume of water flowing into the sewer is but slight. We must ask, then, what becomes of fæcal matter so delivered? If there is formed at the outlet of each private drain a little cone of fæcal dejections, as the Commission may see at those points where the experiment of direct discharge has been made, it is necessary to remove this accumulation of ordure at least once a day. What would be the quantity of water necessary to facilitate the dilution of these matters, their removal, and the rinsing of the sewer? What would be the minimum interval between two successive washings? These are questions which must be solved."

The demonstration seems complete. In the actual state of things, the sewers which receive, aside from the water of extended rains, only the water of the washing of the street under which they are placed, and the liquids derived from the houses which border the street, have a current which bears no proportion to the dimensions of the channel which they afford; these sewers are thus placed in a most unfortunate condition, whether from the point of view of cleanliness or that of general salubrity, and to remedy this essential defect, the quantity of supplementary water necessary to use would be extremely great. M. Humblot tells us that more than one-half of the sewers are of this character.

If we pass from primary sewers to secondary ones, and then to tertiary ones, and so on to the collectors, the objections cited above decrease more or less rapidly, according to circumstances.

In the secondary sewers the flow increases and becomes more regular without an increase in the size of the invert. Therefore the conditions of cleanliness and salubrity are better, and the improvement continues until we reach the collecting sewers, which carry constantly an abundant flow, and to which there is also applied apparatus for automatic cleansing, which could not without exorbitant cost be made to operate in sewers of less importance, which are thus far ill adapted for their use.

It results from the present conditions that in the actual state of things, from a sanitary point of view, it is the sewers of the least importance which offer the greatest difficulty; that it is in these that the difficulties are the hardest to correct; and that it is in these, also, that the causes of infection to which they are already subjected would be the most increased by the discharge into them of domestic wastes.

Everything, then, leads to the conclusion that for the evacuation of domestic wastes it is necessary to seek some arrangement which may

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[1] See *American Architect* for April 21, 1883.

be substituted for these sewers. Waring's system, as it has been set forth by M. Poutzen before the Second Sub-Commission, seems to furnish, under excellent conditions, the elements of this substitution.

If the trials, which are to be made in pursuance of the determination taken by the Second Sub-Commission, confirm the principal advantages attributed to this system — if the trials demonstrate: —

(*a*) That by means of simple arrangements, easily to be adapted to soil-pipes and house-drains, the house can be connected by a bell-mouthed branch (of earthenware), of which the diameter varies from 10 to 15 centimetres, with pipe-sewers established under the public street, having a diameter of from 15 to 20 centimetres for the primary pipes, increasing successively as the needs of the current require;

(*b*) That in these pipe-sewers, of such size as to run only one-half full with the ordinary flow, with an average velocity of 70 to 80 centimetres per second, the variations of flow from hour to hour are slight, so that deposits will not easily be produced, and that provision is made for the removal of such deposits as may accidentally be formed by means of automatic flushing, more or less frequent, sufficient to clean the walls of the sewer, alternately made wet and left dry by variations of the flow;

(*c*) That in these pipe-sewers the air above the level of the liquid is never stagnant, and that its circulation, artificially increased by fresh-air inlets established at the successive junctions of the sewers, is assured by the extension of soil-pipes above the tops of the houses; and,

(*d*) That under these conditions, household wastes and water-closet matters — diluted ordinarily in the proportion of one part solid to eighty or ninety parts liquid — being rapidly carried forward, take on and give out no foul odor, not even requiring the use of traps under closets.

If these fortunate conditions are practically established, it seems to us that Waring's system offers an important means (*ressource précieuse*) of urban sanitation.

The flow, and this is essential, is produced in this system by the simple force of gravitation; there is no complicated mechanism at any point, not even in the automatic flush-tanks; there is no clock-work; there is no trapping of the pipes; there is no indispensable water-seal; all is simple, sure, and inexpensive. Let us add, from another point of view, that unless we wilfully disregard the most elementary rules of hydraulics, we cannot avoid securing, in the ordinary conditions of flow, constant movement at every point at a predetermined velocity.

A single circumstance may suggest some difficulties: the absence of sufficient fall. Although the lack of fall may be supplemented in great measure by an augmentation of force or an increase in the number of the flush-tanks, it is necessary from an economical point of view not to go beyond certain limits in the volume of water to be used. Under the conditions of this system this difficulty is not grave. We may always increase the fall by having recourse to pumping, and were this condition necessary in certain parts of Paris, it would cost but an insignificant outlay. The daily discharge of the sewers of Waring's system will rarely represent, including the flushing water, more than 20 litres for each of the population. That is to say, 45,000 cubic metres for all Paris. Were it necessary to pump a tenth part of the whole flow one horse-power for each metre of lift would be sufficient. There is therefore in this nothing which need disturb us.

THE ILLUSTRATIONS.

THE CATHEDRAL OF ALL SAINTS, ALBANY, N. Y. — THE INTERIOR LOOKING EAST; THE SOUTH AISLE; THE NORTH SIDE OF CHOIR FROM THE SOUTH TRANSEPT; SOUTH CHOIR AISLE, AND AMBULATORY. MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

For description see the *American Architect* for July 14.

COMPETITIVE DESIGN FOR A $3,000-HOUSE SUBMITTED BY "*Qu'en.*"

"No contrast to the preceding design could be greater than that which '*Qu'en*' offers us. Self-conscious and affected, full of clever conceits which are pushed into mannerisms, this competitor's remarkable facility is his stumbling-block. While nothing could be more charming than his design, if considered as the plaything of a wealthy owner, on the other hand it is utterly unsuited for our purpose, while the one or two servants of the modest establishment proposed could never give the constant care necessary to keep clean the numberless little panes indicated, and these themselves and their curving sashes and cornices are costly luxuries. Again, the charming hall, occupying two stories, is far beyond our straightened means; so is the pretty carving which is nonchalantly scattered through the design. In spite of any relief such joyous extravagance may have been to the jury after the plain, economical schemes presented, this design is evidently not a solution of the programme. The plan is clever and full of decorative points, without sacrificing comfort, but it is also ingeniously expensive. The fireplace of the hall crowds upon the door inconveniently. The drawings are brilliantly rendered." — *Extract from Jury's Report.*

COMPETITIVE DESIGN FOR A MECHANIC'S COTTAGE SUBMITTED BY "*Utile Dulci.*"

"'*Utile Dulci.*' The plan in the first story seems complicated; alcoves four feet wide are not useful. While a lodge on a country estate might well have rooms in the roof, so that the building might be low and picturesque, a mechanic building his own house would wish as good and clear second-story rooms as possible. This plan also requires two chimneys. The cottage is, however, picturesque and the drawing remarkably good." — *Extract from Jury's Report.*

HOUSE FOR DR. W. FINLEY, DENVER, COLO. MR. F. J. STERNER, ARCHITECT, DENVER, COLO.

THE $3,000-HOUSE COMPETITION. — XVII.

ABSTRACT OF SPECIFICATIONS SUBMITTED BY "*Qu'en.*"

Excavations: — Excavate for cellar and for 8" outside of walls. Space outside to be filled with broken stone and laid to drain.

Walls, Stone: — Build cellar walls, 18" thick, range work, laid in equal parts lime and cement; pointed up and smooth on outside. Bed sill in cement mortar.

Chimneys: — Flues smoothly plastered on inside, and 2-inch air-space between all chimneys and wood-work. Build of hard brick and lime mortar.

Ventilation: — Set cold-air box and hot-air boxes of tin, and line passage of hot-air box near all wood-work with bright I. C. tin.

Cellar Bottom: — Cement cellar bottom; two coats Buffalo cement on bed of grout.

Plastering: — Two-coat plastering; Port Byron white lime, long winter hair, clean sharp sand and clean water; second coat, no hair.

Laths to break joint every six courses.

Lumber: — All lumber of white-pine, sawn die-square; dry, free from sap-wood, shakes, or loose knots.

Scantlings: — Sill, 6" x 6", painted on under side; bridge partitions; plate, 4" x 4"; joists, 2" x 10", bridged and crowned; studs, 2" x 4"; door and window studs to be doubled. Joists, studs and rafters, to be 16" on centres; rafters, 2" x 4"; false girt, 1" x 6"; bridge floors.

FROM CHURCH OF ST ETIENNE. BEAUVAIS. FRANCE.

Cut-off Partitions: — Cut off all communication between first and second story outside walls, and also between second-story floor joists and attic, with brick.

Sheathing: — Cover outside of building, including roof, with surfaced sheathing.

Paper: — Cover above with "iron-bound" paper, well lapped, and laid double around openings.

Shingles: — Shingle roof and walls down to sill with common XX shingles, 4" to weather on roof, 6" on walls; two nails to a shingle.

Outside Finish: — Second quality stuff for outside finish.

Piazza: — Piazza post solid; floor laid open joint, 3" wide; second flooring laid in white lead.

Floors, Pine: — Under floor in first and second stories of surfaced sheathing; second flooring for attic floor; upper or finished floors of second flooring with hard-wood edge, in hall, living and dining-room. Kitchen floor of soft maple.

Sash: — One and three-quarter-inch sash throughout; bronzed sash-locks; double strength American glass to be used.

Furnace: — Set furnace selected by owner.

Doors: — Front door to have night-latch, bronzed door fittings.

Stairs: — Treads, 1¼"; risers, ⅞".

Inside Finish: — All of clear white-pine, painted three coats in lower rooms; two coats above.

Wainscot: — Wainscot five feet high on lower floor, except kitchen, where it is to be three feet; same in bath-room.

China Closet: — Fit hooks, shelves, etc., in china closet.

Bells: — Good bell communications.

Painting: — Paint outside of house three coats zinc white and linseed oil; putty nail-holes.

Tinning: — Tin eaves-gutters, braces every two feet. Tin step-flashings and down spouts, painted.

Plumbing: — Connections with water-main and sewer. Hot and cold water pipes; soil-pipe of iron, 4", running through roof and open on top. Running trap, vented, between soil-pipe and sewer; S-trap under water-closet, not vented; trap under wash-bowl.

Tin-lined pipes for supply. Lead safes under bath-tubs and wash-bowl; overflow to run to kitchen sink.

Grease-trap, 6" diameter, with opening for cleaning, to be attached to kitchen waste. 12-oz. bath-tub.

Lead and iron pipes connected by brass ferrule. Iron pipe caulked with oakum and run with lead.

Soil-pipe coated inside with hot coal-tar, and painted outside two coats; 35-gallon galvanized-iron (wrought) circulating boiler and a sediment-pipe. AA lead pipe.

Trimmer-Arches: — Build trimmer-arches where shown.

Architraves: — Inside architraves ⅞" x 5", moulded.

Bases: — Bases, 9" high in principal story; 7" high elsewhere.

Splicing: — No sheathing or architraves to be spliced. Outside doors to have weather strips.

Estimate of Quantities and Prices ruling at Minneapolis, Minn.

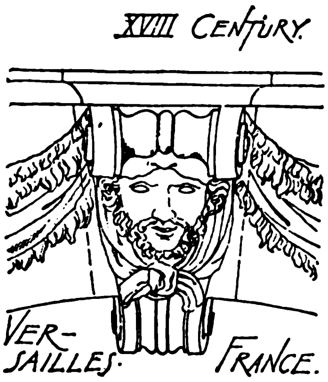
83 perch stone, @ $2.00	$207.50
158 cu. yds. excavation, @ 25 c.	39.50
6000 ft. joist and rafters, @ $20	120.00
3840 ft. studding, @ $20	76.80
8720 ft. sheathing, @ $10	87.20
51,000 shingles, @ $4	204.00
Sheathing-paper	30.00
850 yds. plaster, @ 24 c.	204.00
301 ft. chimney-flues, @ $1	301.00
2400 ft. upper flooring, @ $25	60.00
98 ft. wainscot, @ $1	98.00

7 doors and fittings, @ $15	$105.00
14 " " " @ $10	140.00
28 windows, @ $10	280.00
7 openings, @ $6	42.00
280 ft. baseboard, @ 4 c.	11.20
Painting and finishing	325.00
Stairs	190.00
3 mantels, @ $50	150.00
3 mantels, @ $25	75.00
Plumbing	175.00
Hardware and tinning	90.00
Total	$3,011.20
Contractor's commission, 5 %	150 56
Total	$3,161.76
Architect's commission, 5 %	158.08
Total cost	$3,319.84

The figures given above were mostly obtained from a prominent builder in this city (Minneapolis). After looking at the drawings, he estimated at a guess that it would cost $3,300, which came very near the result got by the detailed estimate.

THE COMPETITION FOR A MECHANIC'S HOUSE.—V.

DESIGN SUBMITTED BY "*Utile Dulci.*"



In order to reduce the cost, the vertical walls of this house have been kept as low as possible. The height, in the clear, of the first floor is 8′ 6″, and in the attic 8′. All doors, architraves, and bases are of stock patterns, except where otherwise shown. The floors are covered with one thickness of boards. The foundation and cellar walls are brick. All outside walls above, except gables, to be covered with pine weather-boarding. The gables to be shingled and plastered where shown.

All framing to be of spruce: the sills to be 4″ x 7″; plates, 3″ x 4″; outside studs, 2″ x 4″; partition studs, 2″ x 3″; first and second floor joists, 2″ x 8″; rafters and ceiling joists, 2″ x 4½″.

The roof to be covered with spruce shingles, and to have dripping eaves. The outside framework, gables, porch, etc., to be painted two coats, as directed.

The cellar under the kitchen would be available for heating purposes as well as stores if required, and a bath-room could be introduced in front attic gable, to be entered from stair landing.

Estimate of Prices and Quantities ruling at Springfield, Mass.

These prices, which include builder's profits, all nails, etc., are quoted by Mr. E. W. Shattuck, builder, Springfield, Mass., at local rates.

125 cu. yds. Take off surface, and excavate 2′ 6″ deep for foundations, and 6′ for cellar, @ 12c.	$15.00
(Distribute where required about site.)	
150 yds. brick foundations and cellar walls 8″ thick, piers and chimneys, 17,573 bricks, laid, @ $10 per C.	190.73
No. 1 extra work to chimney-cap	20.00

STUDDING AND FRAMING.

1300 sq. ft. outside walls, @ $25 per M	$32.50
1250 sq. ft. inside partitions, @ $25 per M	31.25
1000 " first floor " "	25.00
360 " attic floor " "	9.00
1900 " ceiling joists and roofs "	47.50
3000 " rough outside boarding to walls and roof, @ $25 per M	75.00
1200 " weather boarding, @ 30 c. per M	36.00
Outside casings	15.00
1300 shingles to gables (laid), @ $10 per M	13.00
13,314 " " roofs " " $8 "	106.51
17 ft. run cornice in gable, @ 60 c.	10.20
10 large windows, including sashes, lines, pulleys, etc., glazing, architraves and blinds, complete	100.00
12 small windows, complete	96.00
2 cellar windows, complete	6.00
2 fixed frames to staircase in small lights, two or three made to open	10.00
1116 sq. ft. first floor, @ $33 per M	37.00
885 " attic " " "	29.00
4 doors, as per detail, including architraves and hardware, complete, @ $10	40.00
11 stock doors, 1½″ thick, complete, @ $9	99.00
550 ft. run base 7″ high, @ 8 c.	44.00
Outer front porch, railing and seat, as per detail	60.00
Fittings and shelves to pantries and closets	45.00
Principal stairs, complete, as per detail	65.00
Cellar stairs	10.00
12 sq. ft. plastering on wire laths outside gable	3.00
389 sq. yds. lath and plaster walls	97.25
148 " " " " ceilings	37.00
General plumbing, sink, etc., in kitchen	35.00
250 sq. yds. painting, two coats outside, @ 15 c.	37.50
150 " " " " inside, @ 20 c.	30.00
Total	$1,507.44
Architect's commission, 5%	75.00
Total	$1,582.44

A City a Hundred Miles Long.—Santa Barbara's Mayor proposes the consolidation of the governments of the city and county of that name, the object being to save $8,000 a year which the city government costs under the present system. As the consolidation can only be effected by making the municipal limits coterminous with those of the county, Santa Barbara, under this arrangement, would become, territorially, the largest city in the world, say, a hundred miles long by sixty wide, and including a great quantity of farming land and stock ranches, besides several forests containing deer, bears, and other wild animals. It would be a big attraction to summer visitors to know that they could hunt this large game on the back streets. And then just think of being able to boast that some of the householders in the city had front yards containing from 25,000 to 40,000 acres! We would be willing to bet that the Mayor of Los Angeles is mad because he did not think of this idea first.—*San Francisco Alta.*

MODERN ARCHITECTURAL PRACTICE.[1]—I.

It is now nearly two years since a lecture on architecture was given in this room. Our late professor was taken from us in the meridian of his power, as a teacher and an exemplar of what an architect ought to be. We were at first too much overwhelmed with the loss sustained, personally, and by our art, to be in a mood to address you on subjects which had lately been so lucidly analyzed by our friend and master, and nothing would have induced me now to undertake the task of addressing you but an anxiety to be loyal to the twice-expressed wish of those who rule us here, and who I feel have a right to the services of the humblest of their members as of the most illustrious, if they choose to demand them. It is from this motive alone, and not from any sense of ability to follow in the steps of such a demonstrator of the anatomy of architecture as was our late professor, that I am here to beg your indulgence and kind attention to-night.

Those of you who were students in our Architectural School two years ago, will I know, agree with me in deploring the loss of Professor Street. His wonderful knowledge, acquired by personal observation, his readiness to impart it, the facility with which he used his pencil to illustrate his point, his contempt for whatever was mean or false, either in the character or the art of men, his outspoken condemnation of it, his love of whatever was pure, honest, and of good report, his astonishing industry (so that during a so-called holiday he would do more than many of us during the rest of the year), and, above all, his faith in his art as a living art, made him to us here the model professor of architecture.

I hardly know whether to admire him most as a man or as an artist — the practical architect or the learned professor. He was great in each aspect. *We* know him best by his successful teaching in the schools, and by his inimitable lectures, in which he carried the enthusiasm of his audience wherever he chose to take them. It mattered not what building he chose to dissect, whether it was Pisa or St. Mark's, Chartres or Salisbury, he seemed equally at home in all; he knew not only their builders, but what their special difficulties had been, and how they had gone to work to overcome them; how their age and country had affected them in general, and how their special circumstances in particular. I should strongly advise you to read his Royal Academy lectures — even those of you who had the advantage of hearing them, especially the last three, on Italian, French, and English mediæval art. They are as interesting as a romance, and eminently useful to every student of art.

It is, indeed, melancholy to reflect that in less than four years the Royal Academy lost three professors of architecture — all of them men of the highest mark, though in a somewhat different way. Since I received the request to address you to-night, I have looked through their lectures again, to see if there were any path which I might venture to tread where they had not been before me. In this I have met with but indifferent success. Professor Scott gave you in his nine lectures an exhaustive exposition on the history, *rationale*, study, and practice of Gothic architecture. Professor Barry took a somewhat wider range. His published lectures (three of which were written for you, but, alas! never delivered) were divided under two heads. In the lectures under the first head he went fully into general principles, while in the thirteen final lectures he traversed the history of our art, beginning with the Roman period, and proceeding through mediæval times, through the various English styles to Sir Christopher Wren, and then treating of Italian architecture, from Giotto to Vignola. Our latest professor's lectures, have not, as you are aware, been published as a collection and illustrated, as I hope they will be; but those of you who were students here two years ago, will have in your memory their catholic spirit; how the lessons he inculcated were drawn from Greek art as well as from that to which he particularly attached himself.

I feel that, instead of rambling over any of the ground so successfully occupied by your late distinguished professors, on this single occasion on which I am likely to address you, it would be better for me to earnestly commend their lectures to your renewed consideration, as being both very interesting in themselves, full of what is all-important to the architect, and well worthy, I venture to think, of the consideration of both painter and sculptor; and, having done so, to ask your indulgence while I make some discursive remarks on matters which were not much enlarged upon by them, but which have occurred to me whilst I have been reading these lectures with the aforesaid object in view.

When one reads the lectures of the two distinguished men whose remains now rest within the walls of the abbey they loved so well, and whose advocacy of the architecture which that noble building typifies

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[1] A lecture delivered at the Royal Academy, February 8, by Alfred Waterhouse, A. R. A.

for us was so constant, so able, so full of enthusiasm, one feels sad that their labors have not borne more fruit, and, perhaps, that those of us who come after them have not been more earnest in following closely in their footsteps, so as by every architectural effort of our own to have helped forward as directly as possible the cause they had at heart — a nineteenth-century development of thirteenth-century architecture. But I confess that ten years ago the prospect of doing this looked brighter than at present. The public does not seem to be sufficiently with us in this endeavor. The wave of enthusiasm for a thirteenth-century revival has somewhat spent itself. It may, however, be better for true architectural progress that we should not attempt to resuscitate fully a bygone period of art, but content ourselves by earnestly studying it, so as to become entirely imbued with its beauty, its constructive excellences, its direct solution of the varied problems of its day, while we are at the same time earnestly endeavoring to solve the problems of our own day, with its new wants and new materials, in the most directly artistic manner of which we are capable.

If there is no longer any authority as to the style in which we should practice, it is because there are no longer the old convictions. If we once more acted from conviction, there would no longer be shifting about from one style to another. We should no longer be anxious as to what style we should adopt for a particular building. All we should be anxious about would be to justify everything we did when brought to the test of intelligent criticism and sound reason.

Art now-a-days has lost its way. One calls to it, "This is the right way," whilst another points in a different direction. The only wise course in such a difficulty is to fall back on first principles, and to walk cautiously. Everything should have a clear purpose. No feature, no moulding, no member of a moulding, but should be applied with a distinct and definite intention. "Clearness, and a freedom from everything doubtful and untruthful, is the inseparable companion of taste." When we had to draw a curve, it would be the sort of curve best adapted to enable the material so fashioned to fulfil its function. If a wooden brace, it would almost certainly have a slight segmental curve instead of the quadrant of a circle; if the bell of a capital supporting a heavy weight, the curve would also be a slight one. It is instructive to examine the capitals of Doric columns in this respect, and to notice the vigor and refinement they ultimately assumed as they changed under Greek criticism. The lines of the human form will give you the best possible illustration of the beauty and variety of the curves of vigor which may be employed by us; and, therefore, the Academy has encouraged its architectural students of the higher grade to study the figure in its life schools; and I should strongly advise you to avail yourselves of the advantages this opens to you. By familiarizing yourselves with this highest type of beauty, you will learn to loathe redundancy of meaningless ornament. Your buildings will be marked by *style*, which is a very different thing, and more precious, than blind adherence to any one of the styles of the past. I hope yet to see the day when they will not be named among us as practising architects. I have, I confess, the greatest possible objection to hear the question asked concerning a modern building, what is its style? What we want to know is, does it perfectly fulfil its functions? Have the refinements of proportion been considered by its designer? Has nothing been left to accident or to chance?

We are now-a-days overwhelmed with a mass of treatises on architecture, books, lectures, drawings, photographs, to say nothing of weekly literature on the subject, so that if one would read all, one has little or no time to think. Now with those who preceded us it was not thus. They had a vernacular architecture in which they could perfectly and naturally express their thoughts and aspirations. They had nothing to do but think and act. We are cumbered by a host of traditions, but half believed in by most people, and a world of new sciences which lead us away from these traditions.

Instead of the temples, amphitheatres, and basilicas of Classic times, and the enormous mediæval cathedrals and castles which formed the chief architectural achievements of the past, we have now to apply our intelligence in the erection of places of worship of more moderate dimensions, concert-rooms, theatres, and other rooms of assembly, in which the difficult problem has often to be solved, how to bring the greatest number under the influence of one voice without fatigue to the speaker or his audience. Then we have to erect buildings applied to very complicated and multifarious uses, as town-halls, courts of justice, and Government offices (where the convenience of the whole depends upon the proper allocation of the different parts), museums, picture-galleries (in which the character and direction of the light is all-important), hospitals, and even ordinary dwellings, in which an attention has to be paid to sanitary science which would have astonished our forefathers, palaces, club-houses, gigantic hotels, colleges, public schools, and other educational buildings, all highly complete in their arrangements, and requiring for their successful designing a mind in sympathy with the wants and aspirations of to-day (rather than longing for the resuscitation of what was perfect yesterday); therefore, when we proceed to catalogue our new wants, it seems reasonable that we should not be too archæological in our way of meeting them. The new materials presented to our notice as offering advantages over the old, add still more force to this view of the case.

It is undoubtedly the duty of the architect to avail himself of such, when manifestly superior to those hitherto in use. Our prejudices are nevertheless greatly in favor of those which have been hallowed by universal use in the past, often with such glorious results, and so long as granite, marble, the more durable sorts of stone, slow grown and straight-grained oak, and even good, honest brick, tile, and terra-cotta can be had, it is difficult to conceive what better stuff the world can place at the disposal of the architect for the realization of his dreams; but we must remember that our quarries and forests are rapidly getting exhausted. "Crown Memel fir" (which occurs in every architect's specification) describes an almost obsolete sort of timber. Even in America, men are beginning to calculate the number of years her hitherto boundless forests will last, and to say they can be counted on their fingers. In my own experience, the deterioration of the natural building material in the market is very marked. This, of course, means a worse article, or one at a greatly enhanced cost, even if it can be had for money at all.

What, in the face of this difficulty, seeing that, with very rare exceptions, indeed, we have to count the cost of all we undertake, is the architect of the future to do? He will have, in the majority of cases, to betake himself to new materials. If, in the treatment of these new materials, he contents himself, either from indolence, or, what is far more likely in the present day, from archæological considerations, with blindly reproducing forms which have hitherto satisfied him and others of cultivated taste, but which have gathered round no longer attainable material, and which do not develop the peculiar properties of the new material with which he has to do in the directest and the most economic way, then he can no longer claim to be a scientific constructor, and he will cease to be an artistic one.

Some people maintain that the Greek temple proclaims its descent in its principal lines from a timber prototype. Be that as it may, I can see nothing in its construction but the most common-sense appliplication of the materials used (marble or else very coarse calcareous stone, covered with a thin layer of stucco to receive color), to meet the special requirements of the case. Every stone seems to have fulfilled its function with special regard to its qualities as stone.

The like may be said of mediæval building, though the result was so curiously different. All the material used, of whatever sort, was applied in the way to which the peculiar property of the material lent itself most naturally. Brick was never made to do duty as stone. A veneer of marble was never treated to look like solid blocks of the same materials.

Of all comparatively new materials the modern architect has to take chief account of iron. Its remarkable qualities, its power of resisting compression, its wonderful tensile strength, render it one of the most useful servants of the building constructor. Its cheapness, too, when these qualities are taken into consideration, is another powerful factor in favor of its use. On the other hand, we know that it has certain inherent defects, such as its oxidation when exposed to the action of the air, and its rapid and total loss of the marvel of its strength when subjected to a very high temperature. This points to its being protected both from the action of a damp atmosphere, and from the effects of fire by some impervious coating of cement or plaster. This application of plaster to the soffit of a wrought-iron beam, or as a casing to a cast or wrought-iron column, is as common-sense and intelligent a use of the material employed as the coating of stucco to a Doric column formed of the coarse calcareous breccia mentioned above. Only let the column from its delicacy proclaim its iron core, and there will be no false construction about it; and as much true art-perception may be shown in the treatment of its plaster covering as we admire in the exquisite lines of the Doric column.

With regard to the safety of iron thus treated, in the case of the severest fires, we have had already some proof. As, however, it is impossible to make any material absolutely air-proof, it is as well always to give excess of thickness to all parts of an iron structure, even to those not subjected to any strain, so as to allow for a reasonable amount of oxidation, as, for instance, to the web of a beam (its neutral axis), being neither subjected to the compression experienced by its upper flange, nor the tension experienced by its lower. When the formula for the construction of wrought-iron beams was first discovered, beams were made of a web of almost gossamer thickness. Such beams, I have heard an engineer remark, should be kept in vacuum at a uniform temperature of 60° Fahrenheit, and then they would doubtless continue to perform their functions for an indefinite time; but such not being the conditions in which they find themselves, they must sooner or later yield to circumstances. It behooves us, therefore, in the employment of iron, to take account of atmospheric deterioration, and also to beware of the too great facilities it gives of superimposing great weights over voids, as of walls many stories in height dividing a number of small apartments above one large one. Such is not desirable construction, though it may have sometimes to be resorted to: and is one of the evils begotten of competitions, when, in order to fulfil the instructions to the letter, many expedients have to be resorted to, which a skilful constructor, if unshackled by such conditions, would know how to avoid. Moreover, however carefully you may case your iron, so as to cause it to retain much of its power during a fire, you can hardly so isolate it from heat as to prevent its serious expansion, and the consequent disturbance of the stability of your walls.

The celebrated architect and archæologist (M. Viollet-le-Duc), in his lectures "On Architecture," is very earnest in directing the student to the importance of iron as the building material of the future, and he gives several illustrations of its application to architecture, which are all of them strikingly novel and ingenious. In every case, however, he exposes his iron to view, and thus appears to omit from his consideration the danger arising from fire, unless, indeed, his

structures are not only absolutely fire-proof in all their parts, but are kept free from inflammable contents, and inflammable neighbors also.

MORE VANDALISM AT VENICE.

MONUMENT TO PARMIGIANINO, PARMA. ITALY. Giovanni Chierici. Sculptor.

Many of our readers will doubtless remember the little island of Sant' Elena that lies just off the public gardens at Venice. It is always a beautiful object, whether it be in spring, when the buds are bursting upon the trees of its garden, or in late autumn when the bare branches stand relieved against the red wall of the old monastery, and the pines and cypresses acquire a greater value of color from the absence of any other green. The island is so picturesquely placed, detached from Venice and yet in a measure belonging to it, like a full-stop at the end of a sentence, that most people must recall it with pleasure. The memory of it lurks unobtrusively in some still corner of the mind. No one has written much about it; no one has insisted that it must be preserved; no clamor of laudation has drawn the public eye to its quietude. We might therefore have hoped that the island would escape the invasion of the commercial spirit, and be left, as it was clearly intended to be, the finale and close to the splendid sweeping curve of the Riva degli Schiavoni and the public gardens. But publicity and obscurity are equally perilous to beautiful things. A company has bought the island of Sant' Elena, and is engaged in converting it into an iron foundry. A new island of forced earthwork is rising in ugly squareness around the old Sant' Elena, destroying its natural beauty of line; wharves and landing-stages are springing into view; and the place is no longer recognizable by its friends of old.

For the antiquarian and for the lover of the picturesque alike the sacrilege is horrible. The island possesses a beautiful church in the Gothic manner, disused now for some time, and covered with a rich mantle of ivy, but still a very good specimen of fourteenth-century Italian Gothic; while the titular saint, the Sant' Elena from whom the island takes its name, is no less a person than the Empress Helen, mother of Constantine the Great. Her body was said to have been brought here and laid in the vaults of an earlier church, over which the present building was raised. And, coming to more recent and authentic times, this church has been the burying place of many a famous Venetian of the Giustiniani and Loredano houses. During the last few months workmen have been busy breaking up the vaults and many noble ashes must have been scattered by the laborer's pick. The remains of the Empress saint, however, have escaped this indignity, for the urn supposed to contain them was removed some years ago to the Church of San Pietro di Castello. But it is not the outrage to the antiquarian sentiment of reverence that is most to be regretted. No one who loves Venice can fail to feel the deepest sorrow that a lovely and essential part of the city is passing away. After all, it is the outside of Venice, the present every-day aspect of the place, that concerns most of the people who visit it. Buildings that threaten to come down must be restored, and pictures may have to be retouched or left to perish; either is a serious loss to those who know about such things; but they are few out of the many to whom Venice as a whole is the most singular and fascinating city in Europe; and there is no one of these who will not miss the accustomed beauty of Sant' Elena, and will not feel that, by its desecration, the charm of the city has suffered an irreparable injury.

There are places we all of us know to be lovely, and yet, for some reason or other, we keep our knowledge to ourselves. We do not go into raptures over them, nor write of them, nor talk of them; indeed, there is even a sense of injury, an impression that trespass is being committed on our private demesne, when by accident we find that some one else holds the same appreciative views which we believed peculiar to ourselves. No one talks or writes about the Lake of Bourget as they do of Como; yet no traveller by the Cenis will forget how lovely that lake is by day, or still more so when the moon is pouring her light upon the water through a mellow haze just tinged with blue, and the great white château of the House of Savoy gleams cold and weird above its headland on the further shore. So all will talk of the Lido or of San Giorgio; but most of those who know Venice will have Sant' Elena in some quiet nook of their hearts. It was so pleasant to go there on a lazy afternoon in spring. One was sure of stillness and abundant sunshine. The old gardener, a character in his way, whom Scott would have rejoiced to draw, seemed part and parcel of the place, as wrinkled and venerable as the trees he lazily pruned; he would receive the visitor as though the place belonged to himself, but soon left him to wander at will through the garden. It could hardly be called a garden, but rather a wild shrubbery, surrounding a stretch of lawn spread out beneath an avenue of wych elm and sycamore. In the sward the periwinkles and violets and potentillas, with fruit like strawberries, and therefore called by the Italians "*ingannadonna*," ran riot together. At one end a little grove of pine and cypress offered its shade, and at the other a row of pomegranates put out scarlet blossoms in July. The old cloister of the monastery, open at one side to the garden, enclosed rose-beds; and up the slender shafts and round the capitals vine stems were trained. All the stone-work was coated with a fine surface of lichen, and the "*silentium*" above the broken door of the dormitory was half covered with velvety green mosses and fern that had taken root there and in the heavy Renaissance mouldings of the lavatory which stood by the refectory door. The whole garden was in admirable confusion, tangled and wild and left to itself, yet beautiful to wander in. From one corner of the island you saw the Alps rising behind Venice, each familiar peak and ridge sharply defined in serene weather — Antelao, Trofana, Sorapiz, known to the traveller among Dolomites; or else, to the left hand, far away, the Euganean hills threw the reflection of their cones upon the water.

The place was perfectly quiet and peaceful, and silence brooded above it, except for the lapping of the water on the foundations of the old brick walls, or the distant and muffled hum, borne from the arsenal across the lagoon. The crabs had it all to themselves on the oozy mud-banks that lay around the island, and fought and raced through the shallow water, leaving a rippling trail on its surface. But now their hunting-ground is covered with basements for sheds; the old monastery walls are fast being overthrown; most of the trees have been felled, and the axe is laid to the roots of the rest; a wide and yawning ditch is dug right down the middle of the lawn; soon the machinery will begin to arrive; the black pennon of smoke will stream from the chimney; the place will resound to the clank of engines. There is no hope of reprieve. Sant' Elena has gone through many changes of fortune. It has been monastery, barracks, and even bakehouse ere now; at the opening of this century there were forty-three ovens and a hundred German bakers at work upon the island. From all these it has suffered little ill, or time has repaired the ravages inflicted. It would be mere folly, however, to hope that Sant' Elena will ever recover from the injury of the iron foundry to which it is doomed. — *Pall Mall Gazette.*

NOTES AND CLIPPINGS.

The History of a Suit of Armor. — A suit of armor that originally belonged to King Francis I of France has had a strange history in modern times. It was bought, says a correspondent of the *St. James's Gazette*, by the late Sir Anthony Rothschild for £100, and sold by him to the late Lord Asburnham for £1,000. Some years afterward it was sold by Lord Ashburnham for £4,000 to a dealer in curiosities, who resold it within twenty-four hours to a wealthy customer for no less a sum than £17,000. The subsequent history of the armor is even more remarkable. It was deposited by its purchasers in the Belgrave-square Pantechnicon, and when that unfortunate building was destroyed by fire the armor was buried beneath the ruins. Dug out of the débris, it was sold for a few pounds as old iron. It survived, however, even this degradation; for, after undergoing a process of renovation, it was subsequently sold for £12,000 to Mr. Spitzer, of Paris, where it is said to be now on sale for £20,000.

Rotterdam. — Rotterdam, with the exception of the church of St. Lawrence, of the construction of which Washington Irving gave a comic sketch in his "Knickerbocker," is in some respects one of the most prosaic cities in the world. Hood hit it off happily enough when he called it a kind of vulgar Venice, though, like Venice, its commerce and commercial arrangements have been indefinitely developed since Hood's days. But, vulgar or not, there is much that is picturesque about it, as any one must admit who has admired the studies of its streets and canals by the most eminent of the Dutch masters on the walls of the picture galleries. It is not everywhere that you can see a fairly-sized East Indiaman berthed full in front of the mansion of its owner, so that the skipper leaning over the quarter-rail can deliver a parcel on the doorstep. Then the visitor can study original fashions of existence in the lives of the crews of those cargo boats on the canals, which are in some sort a survival of the comfortable old *treykschuyt*. The boat is generally occupied by the master and his mate and his wife, with a family more or less numerous. The cooking goes forward in the half-decked caboose, and you can watch all the other details of the domestic arrangements. Nor is due attention to the graces and adornments of life by any means neglected, although the man in command seems the very embodiment of the prosaic, in voluminous undergarments which emerge from the tobacco smoke that invariably envelops his upper person. There is pretty sure to be a hanging garden on the stern, with the gayest flowers that may be blooming in the season; and the skipper of each canal craft is as enthusiastic a horticulturist in his way as any of the tulip-fanciers of Haarlem or Leyden. Moreover, on board as on shore, you are easily struck by the intensity of the cleanliness that has become proverbial in Holland. "Water, water everywhere," you murmur again, should you venture out for a stroll in the early morning. The housewives are splashing pailfuls of water about your legs as they are dashing them against the speckless doors and windows. Each brazen knocker glistens like burnished gold, brought to the extremity of polish by an excess of hand friction; while the very buckles on the harness of the dog-teams in the milk-barrows sparkle to each gleam of the watery sunshine. — *Saturday Review.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

282,033. Hand-Vise. — George Amborn, Jr., and Edwin D. Chaplin, Pawtucket, R. I.

282,077. Bolt. — Benoni J. Hardin, Springfield, Ky.

282,079. Fire-Escape Ladder. — John S. Harrison, Clinton, Iowa.

282,082. Composition for Water-proofing and Preserving Walls of Buildings. — Theodore Hunt, St. Louis, Mo.

282,109. Weather-Strip for Door-Sills. — Joseph G. O'Kelly, Chicago, Ill.

282,126. Pipe-Wrench. — Frank A. Simonds, Grand Rapids, Mich.

282,138. Roofing-Composition. — Welcome White, Everett, Mass.

282,139. Roofing-Felt. — Welcome White, Everett, Mass.

282,160. Weather-Strip. — D. Lawton Cady, Holly, Mich.

282,764. Tile-Fastening. — Albert Chase, Boston, Mass.

282,167. Ceiling. — William S. Cogswell, Hyde Park, Mass.

282,186. Pneumatic Door-Bell. — Robert P. Garsed, Norristown, Pa.

282,191. Metallic Skylight-Bar. — Geo. Hayes, New York, N. Y.

282,208. Weather-Strip. — Thomas B. McCurdy, Lancaster, Tex.

282,212. Fire-Escape. — Charles Murdock, New Rochelle, N. Y.

282,2 6. Weather-Strip. — Clinton M. Packer, Cambridgeport, Mass.

282,219. Artificial Stone. — James S. Pierce, Portsmouth, N. H.

282,236. Lift and Hoist. — John S. Stevens, Chas. G. Major, and David P. Edwards, London, Eng.

282,246. Electric Bell-Pull. — Frank J. Wall, Lawrence, Mass.

282,248. T-Square. — Jacob Weidenmann, New York, N. Y.

282,251. Boring-Brace. — Azro H. Adams, Santa Rosa, Cal.

282,256. Combined Pipe-Tongs and Wrench. — Elbridge F. Barnes, New Haven, Conn.

282,290. Sash-Fastener. — Emanuel Ensminger and Henry S. Ensminger, Bloomington, Ill.

282,298. Pipe or Nut Wrench. — Dan P. Foster, Waltham, Mass.

282,308. Hammer. — Christopher J. Grellner, St. Louis, Mo.

282,314. Combined Stand-Pipe and Fire-Escape. — William and John M. Heffner, Minneapolis, Minn.

282,334. Transom-Lifter. — Wm. Leggott, Bradford, County of York, England.

282,351. Fire-Escape. — Charles W. Mills, Philadelphia, Pa.

282,362. Flexible Fire-Escape Ladder. — David A. Peters, Hagerstown, Md.

282,367. Sash-Balance. — Calvin O. Power, West Newton, Pa.

282,372. Pipe-Wrench. — Eugene H. Robbins, Pittsfield, Mass.

282,413. Fire-Escape. — Geo. H. Thompson, Plattsmouth, Neb.

282,426. Artificial Stone. — Jas. S. Watts, Baltimore, and Lunsford G. Watts, Pikesville, Md.

282,435. Pipe-Cutter. — Elbridge F. Barnes, New Haven, Conn.

282,437. Device for Preventing the Escape of Effluvia from Privy-Vaults and Drains. — Henry C. Buddenberg, Cincinnati, O.

282,439. Device for attaching Roofing-Slates. — Josephus C. Chambers, Cincinnati, O.

282,470. Blind-Hinge. — Charles G. Shepard and Peter Adams, Jr., Buffalo, N. Y.

282,478. — Fire-Escape. — Seth D. Woodbury, Lynn, Mass.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Since our last report eighteen permits have been granted, the more important of which are the following: —

Wilhelmina Myers, two-st'y brick building, e s Patterson Park Ave., between Aliceanna St. and Canton Ave.

Ann Morgan, two-st'y brick stable, w s Vincent Alley, n of Lanvale St.

St. Catherine's Normal School, two-st'y brick stable, in rear n e cor. Harlem and Arlington Aves.

Howard K. Scott, 6 three-st'y brick buildings, s w cor. Gilmor and Mulberry Sts., fronting on Gilmor St.

Heck & Petzell, two-st'y brick building, s e cor. Saratoga and Eutaw Sts.

Mrs. M. Hart, three-st'y brick building, s s Lexington St., between Howard and Eutaw Sts.

Matthew O'Reilly, two-st'y brick stable, in rear 127 Albemarle St., between Fawn and Trinity Sts.

John C. Parker, two-st'y brick stable, in rear e s Fulton Ave., between Townsend and Lanvale Sts.

A. E. Hellegeist, 10 two-st'y brick buildings, s s Lambert St., between Dolphin and Laurel Sts.

Boston.

Monthly Statement. — During July, 31 permits for brick buildings and 102 permits for wooden buildings were granted at the office of Inspector of Buildings.

Building Permits. — *Brick.* — *Conant St.*, near Bumstead Lane, Ward 22, for James McCormick, cooper-shop, 28′ x 39′ 4″, one-st'y flat; J. H. Kelley, builder.

N St., near East Fifth St., Ward 14, for Henry B. Stratton, 3 dwells., 21′ x 33′, three-st'y flat; Henry B. Stratton, builder.

Eliot St., No. 136, rear, Ward 12, for Walter H. Cowing, workshop, 24′ x 60′, one-st'y mansard; Eliott Stoddard, builder.

Albany St., near Oak St., Ward 12, for B. & A. R. R. Corporation, freight-house, 53′ x 240′, one-st'y pitch.

Chestnut St., No. 140, Ward 9, N. F. Goldsmith and W. H. Kieth, stable, 64′ x 70′, four-st'y flat.

O St., cor. East Fifth St., Ward 14, for City of Boston, school-house, 65′ 4″ and 74′ 8″ x 76′ 8″, two-st'y pitch; Donohue Bros., builders.

South St., Nos. 174-182, Ward 12, for Wm. S. Hill, store, 26′ x 40′, one-st'y flat; Lyman D. Willcutt, builder.

Staniford St., No. 8, Ward 7, for Geo. O. Shattuck, store, 20′ x 34′, one-st'y flat; N. E. Chase, builder.

Village St., Nos. 54 and 56, Ward 16, for G. W. Tuxbury, Trustee, 2 tenements, 40′ 6″ x 55′, four-st'y flat; Stephen Moxon, builder.

Wood. — *Terrace Ave.*, Ward 1, for Eben Brown, manufactory, 18′ x 24′, one-st'y pitch; Thomas Toemans, builder.

Vernon St., near Everett St., Ward 25, for Anthony C. Ludgate, storage, 18′ x 26′, one-st'y pitch; Charles Hampton, builder.

Walnut St., near Wood St. Court, Ward 24, for Henry P. Oakman, dwell., 30′ x 35′ and 44′, two-st'y mansard; H. P. Oakman, builder.

Terrace Ave., near Alleghany St., Ward 22, for Delice M. Nolan, dwell., 15′ and 18′ x 28′, two-st'y flat; J. S. Coullahan, builder.

Walnut St., near Wood St. Court, Ward 24, for H. P. Oakman, two-st'y mansard building, 30′ x 44′; H. P. Oakman, builder.

Rill St., n s, near Hancock St., Ward 24, for Samuel B. Pierce, dwell., 27′ x 32′ 6″, two-st'y pitch; Wm. J. Jobling, builder.

Foundry St., near Dorchester Ave., Ward 13, for O. C. R. R. Corporation, storage, 18′ x 24′, one-st'y pitch; N. K. Randall, builder.

Granite Ave., Ward 24, for Abner C. Childs, stable, 23′ x 32′, one-st'y pitch; Granville Spear, builder.

South St., near Bussey St., Ward 23, for City of Boston, wagon-shed, 18′ x 69′, one-st'y pitch; T. B. McLaughlin, builder.

Bellevue St., near Trull St., Ward 24, for T. H. Warner, dwell., 33′ x 39′ and 13′ x 23′, two-st'y pitch; Wm. J. Jobling, builder.

L St., near East Second St., Ward 14, for Mary E. Whitney, stable, 38′ x 42′, two-st'y flat.

Brookside Ave., between Green and Boylston Sts., Ward .3, for Cable Rubber Company, dry-house, 40′ x 40′, one-st'y flat; John Fish, builder.

Erie Ave., opposite Merrill St., Ward 24, for Wm. H. Wallace, dwell. and stores, 21′ x 41′ and 56′ 3″, two-st'y mansard; John H. Gigie, builder.

Erie Ave., near Merrill St., Ward 24, for Catherine E. Gigie, 2 dwells., 19′ x 34′, two-st'y mansard; J. H. Gigie, builder.

Waumbeck St., near Warren St., Ward 21, for Neil McNeil, dwell., 26′ x 46′, two-st'y; McNeil Bros., builders.

Erie Ave., opposite Merrill St., Ward 24, for Wm. H. Wallace, dwell., 14′ x 26′ and 37′, two-st'y mansard; John H. Gigie, builder.

East Fourth St., No. 786, Ward 14, for Otis Rumrey, dwell., 21′ x 32′ and 15′ x 18′, two-st'y pitch; Henry T. Hutchinson, builder.

M St., near Second St., Ward 14, for John Murphy, dwell., 23′ 6″ x 30′ and 15′ x 18′, two-st'y pitch; Henry T. Hutcheson, builder.

Harvard St., Ward 24, for Frank M. Silva, dwell., 21′ and 25′ 6″ x 32′, two-st'y mansard; Frank M. Silva, builder.

Maverick St., near Jeffries St., Ward 2, for Isaac Boudrow, owner and builder, mercantile, 10′ x 15′, one-st'y pitch.

Forrest St., rear, near Adams St., Ward 24, for Jason Gordon, owner and builder, 2 greenhouses, 11′ x 52′ each, one-st'y pitch.

Frederica St., Ward 24, for F. L. Pierce, dwell., 15′ and 22′ x 28′ 6″, two-st'y pitch; F. L. Pierce, builder.

Brooklyn.

Building Permits. — *Columbia St.*, n w cor. Cranberry St., three-st'y brick dwell.; cost, $20,000; owner, R. G. Packard, 361 Fulton St.; architect, B. O'Rourke; builders, P. J. Carlin and Long & Barnes.

Herkimer St., n s, 100′ w Buffalo Ave., 12 two-st'y frame dwells., gravel roofs; cost, each, $2,500; owner, Jno. J. Studwell; builder, G. R. Waldron.

Bartlett St., No. 30, s s, 225′ e Harrison Ave., three-st'y frame double tenement, tin roof; cost, $4,000; owner, Adam Schauf, Whipple St., cor. Flushing Ave.; architect, T. Englehardt; builders, W. Rauth and H. Eich & Bro.

Herkimer St., s s, 20′ e Kane Pl., three-st'y frame double tenement, tin roof; cost, $3,900; owner, Henry Bricks, Kane Pl., near Herkimer St.; builder, J. Pirrung.

South Second St., n e cor. Seventh St., three-st'y and basement brick flat, tin roof; cost, $8,000; owner, John Schroder; architect, J. D. Reynolds; builder, S. Hough.

Atlantic Ave., s e cor. Saratoga Ave., three-st'y frame dwell., gravel roof; cost, $3,200; owner, F. Sammermeier, 420 East Seventy-sixth St., New York City; architect, C. Peters; builders, E. Sutterlein and W. Nitz.

Halsey St., Nos. 152, 154 *and* 156, s s, 3 three-st'y, brick, stone front dwells., tin roofs; cost, each, $6,500; owner, architect and builder, John S. Frost, 574 Franklin Ave.

Freeman St., No. 214, 75′ w Oakland St., three-st'y frame double tenement, gravel roof; cost, $3,000; owner, Jno. H. Murphy, 326 Oakland Ave.

Fourteenth St., n s, 322′ 10″ e Third Ave., 7 two-st'y frame tenements, tin or gravel roofing; cost, each, $1,500; owner and builder, S. B. Oulton, 108 Boerum Pl.; architect, W. Wirth; mason, O. O'Keefe.

Third Ave., w s, 25′ s Forty-second St., three-st'y frame double tenement, tin roof; cost, $4,500; owner and builder, Jno. H. O'Rourke, 116 Thirty-eighth St.

Macon St., e s, 100′ w Throop Ave., 5 two-st'y brick or stone front dwells., tin roofs; cost, each, $4,500; owners, Granger & Brown, 123 McDonough St.; architect and builder, H. J. Brown.

North Eleventh St., s s, 199′ w Third St., four-st'y brick office-building, gravel roof; cost, $4,000; owners, Poulsen & Egar, North Eleventh St.; architect, F. Winslow; builders, W. & T. Lamb, Jr.

Third St., n w cor. North Tenth St., one-st'y brick foundry, gravel roof; cost, $3,000; owner, etc., same as last.

Grand St., No. 564, s s, 125′ w Humboldt St., four-st'y brick store and tenement, tin roof, iron cornice; cost, $8,500; owner, Philip Licht, Forrest Ave.; architect, T. Engelhardt; builders, Jauer and M. Metzen.

Jefferson St., No. 62, s s, 250′ e Bremen St., two-st'y frame tenement, peaked roof; cost, $3,000; owner, Charles Bethon, 60 Jefferson St.; architect, T. Engelhardt.

Howard Ave., n w cor. Marion Ave., three-st'y brick store and tenement, tin roof; cost, about $5,000; owner, Henry Cordes, Cooper Ave., Ridgewood, L. I.; architect, F. Holmberg; builder, C. Bauer.

Howard Ave., w s, 25′ n Marion St., 4 two-st'y brick tenements, tin roofs; cost, $16,000; owner, etc., same as last.

Greenpoint Ave., s w cor. West St., two-st'y brick office, gravel roof; cost, $3,000; owner, John Englis, Green Point; architect, F. Weber; builders, J. B. Woodruff and —— Bartlett.

Front St., No. 114, three-st'y brick machine-shop, tin roof; cost, $4,250; owner, James Cornelias, on premises; architect, A. Hill; builder, P. Sullivan.

Chicago.

Factory. — Mr. Isaac Tomlinson is building a four-st'y brick factory, 50′ x 123′, to cost $13,000; Messrs. Treat & Foltz are architects.

Hospital. — Treat & Foltz are architects for St. Luke's Hospital, to be five-st'y, 154′ x 161′, of brick, and cost $125,000.

Houses. — Messrs. Treat & Foltz, architects, have completed plans for Mr. P. B. Moulton's three-st'y brownstone house, 55′ x 90′, and cost $100,000.

Same architects have plans ready for a three-st'y brick dwell., for Mr. J. H. Swan, 43′ x 74′, to cost $30,000.

Plans by same architects are complete for three-st'y brick dwell., for Mr. E. P. Hulbard, 50′ x 75′, to cost $15,000.

Mr. W. G. Hibbard will build a three-st'y brick house, 30′ x 80′; planned by same architects, to cost $13,000.

Mr. H. B. Mason's house, planned by same architects, will be three-st'y brick, 27′ x 65′, and cost $11,600.

Treat & Foltz, architects, have planned for Mr. C. L. May a four-st'y brick house, 25′ x 72′, and cost $13,000.

The same architects have plans for Mr. Herrick Johnson's house, to be three-st'y, 20′ x 52′, of greenstone, and cost, $9,000.

House for E. J. Lehman by the same architects at Lake View, 25′ x 80′, two-st'y, and cost $8,000.

Also a house by same architects for Mr. E. J. Lehman, four-st'y, 25′ x 73′, to cost $7,000.

School-Houses. — J. J. Egan is architect for the school-house to be built on Wabash Ave., by Rev. P. Rierdon, to cost $18,000.

Bauer & Hill are architects for the three-st'y and basement school-house to be built on Rumsey St., for Rev. Thomas Burke, to cost $25,000.

Store. — Treat & Foltz, architects, have planned the store-building being erected for Mr. J. Q. Adams, six-st'y and basement, brick, 80′ x 172′, to cost $130,000.

Building Permits. — A. Jahnel, two-st'y flats, 98 Eugene St.; cost, $4,000.

Spencer Prindeville, three-st'y flats, 394 Oak St.; cost, $7,000; architect, Gregg Vigent; builder, L. Weick.

E. Burnham, 2 two-st'y dwells., Prospect Pl.; cost, $6,000; architects, Briggs & Warren; builder, L. Weick.

W. A. Briggs, 2 two-st'y dwells., 3606-08 Ellis Pk.; cost, $7,000; architects, Briggs & Warren; builder, L. Weick.

Thomas Pond, 2 two-st'y dwells., 462-64 Warren Ave.; cost, $6,000; architect, Thos. Pond; builder, L. Weick.

Gabriel Frauchire, three-st'y and basement store and flats, 188 Blue Island Ave.; cost, $5,000; architect, J. Chartand; builder, J. McCarthy.

John McCarthy, three-st'y stores and flats, 190 Blue Island Ave.; cost, $5,000; architect, O. C. Hanson; builder, Jno. McCarthy.

C. Y. Edwards, two-st'y dwell., 1055 Adams St.; cost, $3,000.

Peter Fitzgerald, three-st'y flats, 168 West Eighteenth St.; cost, $8,000; architect, Wm. Thomas; builders, Myer & Provost.

Fritz Fritscher, two-st'y store and dwell., 1038 Lake St.; cost, $3,200.

C. L. Benson, three-st'y and basement store and flats, 389 Chicago Ave.; cost, $6,000; architect, H. Kley; builder, S. J. Bock.

M. F. Donoghue, four-st'y and basement store and flats, 99 West Adams St.; cost, $12,000; architect, G. A. Wierzbienier; builders, McMillan Bros.

Chas. Mahlmann, two-st'y flats, 442 Webster Ave.; cost, $3,000.

James Thompson, 2 two-st'y dwells., 571-3 West Huron St.; cost, $3,000.

P. Gern, two-st'y dwell., 75 Hastings St.; cost, $3,500.

Chas. Kennitz, 2 two-st'y dwells., 178-180 Lewis St.; cost, $5,000.

Wilber Wait, two-st'y dwell., 3201 South Park Ave.; cost, $9,000; architects, Dixon & Townsend; builders, Martensen & Otersen.

N. C. C. Railway Co., two-st'y car-house, Ashland and Clybourne Aves.; cost, $40,000; builder, N. Gerten.

E. F. Welch, 2 three-st'y dwells., 2974-76 Dearborn St.; cost, $6,000.

J. W. Polly, 3 three-st'y dwells., 718-720 North Adams St.; cost, $3,500; architect, Alford Smith, builder, L. J. Daegling.

John McQuaide, two-st'y and basement dwell., 895 Blue Island Ave.; cost, $4,800; builder, C. Buhmann.

L. D. Lauther, 5 two-st'y cellar dwells., 109-117 California Ave.; cost, $20,000; architect, W. Strippleman; builders, Wilke & Holman.

M. Harris, three-st'y store and dwell., 354 West Twelfth St.; cost, $6,000; architect, Peter Ruehl, builder, W. Snelsdorf.

J. R. Busch, two-st'y and basement dwell., 2635 Prairie Ave.; cost, $20,000; architects, Burnham & Root; builder, D. Lane.

E. Woods, two-st'y and cellar dwell., 768 Hinmon St.; cost, $2,800; architect, W. Case; builder, B. Stinebrooks.

M. Brennon, three-st'y store and flats, 3339 State St.; cost, $6,000.

L. W. Felt, four-st'y dwell., 215 East Chicago Ave.; cost, $6,000; architect, R. M. Hanson; builder, E. Menschind.

E. C. Larned, 3 cottages, 3519-22 Lundy St.; cost, $3,000.

John Uber, four-st'y and basement store and flats, 442 Milwaukee Ave.; cost, $12,000; architects, Rogers & Cook.

F. F. Spencer, 2 four-st'y flats, 403-405 North Clark St.; cost, $20,000.

F. F. Spencer, 2 two-st'y flats, rear 403-405 North Clark St.; cost, $3,000.

F. Kollman, three-st'y flats, 173 Dearborn Ave.; cost, $12,000; architect, H. Renwoldt; builder, C. Luehring.

John Serva, two-st'y dwell., 983 Twenty-first St.; cost, $2,000.

H. Doubek, two-st'y store and dwell., 2858 Dashiel St.; cost, $4,000.

Jos. Vlasok, two-st'y dwell., 604 West Eighteenth St.; cost, $4,000.

T. H. Gault, 2 two-st'y dwells., 725-27 Congress St.; cost, $8,000; architects, Dixon & Townsend; builder, T. A. Gault.

Chas. Teatz, two-st'y dwell., 22 Thirty-first St.; cost, $3,500.

Geo. Baird, two-st'y dwell., 2923 Butterfield St.; cost, $3,000.

L. Stegmiller, three-st'y store and dwell., 2427 Wentworth Ave.; cost, $5,000; builder, J. N. Press.

Wm. F. Thomas, 6 cottages, 844-854 Elkgrove St.; cost, $4,800.

Chas. Ehman, two-st'y dwell., 14 Hammond St.; cost, $3,500; architect, P. A. Steinwig; builder, C. Winkler.

J. O. Donohue, two-st'y flats, 358 North Ave.; cost, $3,000.

E. V. Carlson, two-st'y dwell., 126 Sedgwick St.; cost, $3,300.

L. Thoen, two-st'y flats, 215 West Erie St.; cost, $4,600; builder, J. Oleson.

F. J. Ebner, dwell., 548 Larrabee St.; cost, $3,200.

Douglas, Stuart & Forrest, to repair elevator; estimated cost, $7,000.

Henry Vette, three-st'y store and dwell., 1144 Milwaukee Ave.; cost, $12,000; architect, Fred. Wolff; builder, W. Menege.

C. G. Smith, 2 three-st'y stores and dwells., 516-516½ West Madison St.; cost $20,000.

Louis Hammerstrom, three-st'y store and flats, 760 North Halsted St.; cost, $11,000; builder, F. Gottschalk.

R. J. Crane, 9 two-st'y dwells., 259-271 North May St.; cost, $11,000; architect, R. T. Carroll; builder, A. B. Cook.

R. T. Crane, 8 two-st'y dwells., 282-288 Curtis St.; cost, $8,000.

W. D. Jackson, 3 two-st'y dwells., 71-75 Thirtieth St.; cost, $18,000; architect, O. J. Pierce; builder, D. H. Hayes.

Louis Olendorf, 2 four-st'y stores and dwells., 439-441 West Chicago Ave.; cost, $17,000; architect, H. K.; builder, H. L.

James Calvert, three-st'y dwell., 455 West Harrison St.; cost, $4,000.

E. B. Sheldon, 4 two-st'y dwells., 51-57 St. Clair St.; cost, $20,000.

F. Koeppen, two-st'y dwell., 56 West Nineteenth St.; cost, $4,000.

Wm. Short, 4 two-st'y flats, 806-812 Fulton St.; cost, $10,000; architect, Chas. Palmer; builder, H. Hibbard.

Wm. Frank, two-st'y store and dwell., 997 Ogden Ave.; cost, $4,500; architect, F. Wolff; builder, Jno. Krooel.

M. Bland, 2 three-st'y dwells., 266-268 East Erie St.; cost, $15,000; architect, Theo. Karls.

E. B. Sheldon, 2 two-st'y dwells., 51-57 St. Clair St.; cost, $20,000; architects, Burling & Whitehouse; builder, E. Earnshaw.

H. Copeland, three-st'y store and flats, 712-714 Van Buren St.; cost, $12,600; architect and builder, H. Copeland.

Wm. Fitzgerald, 3 three-st'y stores and flats, 739-743 Indiana St.; cost, $21,000; architect, Wm. Strippleman; builder, D. H. Scafes.

D. W. Potter, four-st'y stores and hotel, 129-133 East Chicago Ave.; cost, $40,000; architect, W. A. Furber; builder, A. R. Clark.

Cincinnati.

HOUSES. — Geo. W. Rapp has prepared plans for block of 6 brick dwells., two-and-one-half-st'y, slate roof, on Ohio Ave. and Calhoun St., 71' x 125'; cost, $40,000.

Also for Henry Koch, frame dwell. on Woodburn Ave., Walnut Hills, two-and-one-half-st'y, 38' x 45'; cost, $7,000.

Also brick stable for Julius Balke, two-st'y, 39' x 50', on Lewis St., Walnut Hills; cost, $6,700.

BUILDING PERMITS. — M. Welke, three-st'y brick dwell., Poplar St., near Central Ave.; cost, $12,000.

James Walsh, repair house on Gest St., near Evans St.; cost, $3,500.

Henry Ray, two-st'y frame dwell., Westwood Ave.; cost, $3,000.

Ross Fenton, addition to three-st'y brick, 530 Elm St.; cost, $5,000.

L. Dalmer, three-st'y brick dwell., Bank St., near Freeman Ave.; cost, $6,000.

James Fleming, two-st'y frame dwell., Beech St.; cost, $3,000.

Benj. H. Cox, two-st'y frame dwell., Bellevue St., near Shillito St.; cost, $3,600.

Samuel M. Weiss, two-st'y brick dwell., Queen City Ave.; cost, $2,800.

Three permits for repairs; cost, $2,200.

Total permits to date, 547.

Total cost to date, $2,015,350.

Detroit.

BUILDING PERMITS. — H. Englebert, zoological garden, Michigan Ave.; cost, $6,000.

Wm. Scott & Co., brick fire engine-house, Gratiot Ave.; cost, $11,800.

A. Chapoton, 2 brick stores, Jefferson Ave.; cost, $25,000.

A. M. Gray, 3 brick dwells., Park St.; cost, $10,000.

Joseph Loynton, brick cracker factory, West Congress St.; cost, $15,000.

Archenbron & Meire, addition to church, Joy St.; cost, $13,000.

Alfred Griffith, brick house, Lincoln Ave.; cost, $4,000.

New York.

APARTMENT-HOUSES. — For Mr. Herman Hoefel, an apartment-house, to cost about $250,000, is to be built on the n e cor. of Broadway and Fifty-fifth St., brick and stone front; Messrs. Thom & Wilson, architects.

On the n e cor. of Seventh Ave., a five-st'y brick and brownstone apartment-house, 23' 6" x 80', is to be built, at a cost of about $30,000, from designs of Mr. R. W. Anderson.

FACTORY.—For Mr. Leo. Schlesinger, a seven-st'y and basement factory is to be built of brick, on the n e cor. of Crosby and Jersey Sts., at a cost of about $75,000, from designs of Messrs. H. J. Schwarzmann & Co.

ALTERATION. — No. 47 Broadway is to be altered into an office-building, at an expense of about $35,000, from designs of Messrs. D. & J. Jardine.

CO-OPERATIVE APARTMENT-HOUSE. — Another large building is projected to be built for the West Side Co-operative Association, on the n w cor. of Eighth Ave. and Sixty-second St., to be eight stories high, of brick and stone; to cost about $250,000; Mr. Carl Pfeiffer is the architect.

BUILDING PERMITS. — *West Forty-eighth St., Nos.* 609 *and* 611, three-st'y brick factory, tin roof; cost, $4,500; owner, Honora Taylor, 255 West Fifty-fourth St.; architect, P. J. Taylor; builder, Patrick Walsh.

Twelfth Ave., s e cor. Thirty-sixth St., two st'y brick freight warehouse, gravel roof; cost, $48,000; lessees, N. Y., O. & W. and N. Y., W. S. & B. Railway Companies, 35 Wall St. and 15 Broad St.; architect, John D. Fouquet; builders, Ross & Sandford.

West Forty-ninth St., No. 426, five-st'y brownstone front flat, tin roof; cost, $16,500; owner, Elizabeth Seitz, 18 Beekman Pl.; architect, John Brandt.

Third Ave., n w cor. One Hundred and Thirty-sixth St., 3 five-st'y brick tenements and stores, tin roofs; cost, $14,000; owner, Mrs. Margaret Schmitt, 428 East One Hundred and Twenty-second St.; architect, Geo. W. Walgrove; builder, Frank Schmitt.

Seventy-fifth St., s s, 100' w Third Ave., two st'y brick stable, tin roof; cost, $12,000; lessee, Maurice Sullivan, 348 East Fourth St.; architect, F. T. Camp.

Third Ave., s e cor. One Hundred and Third St., 5 four-st'y brownstone front tenements and stores, tin roofs; cost, $13,000; owner, Francis McEntee, 210 East One Hundred and Fifth St.; architect, F. T. Camp; builder, George H. McEntee.

Elizabeth St., No. 44, six-st'y brick store; cost, $23,000; owner, Charles Gulden, 48 Elizabeth St.; architect, E. Sniffen; builders, Van Dolson & Arnott and Jones & Taylor.

One Hundred and Ninth St., n s, 80' w Fourth Ave., 3 five-st'y brick tenements, tin roofs; cost, $16,000; owner, Mrs. Margaret Griffin, 408 East One Hundred and Thirteenth St.; architect, J. H. Valentine.

One Hundred and Thirty-third St., s s, 150' e Eighth Ave., 3 three-st'y brownstone front dwells., tin roofs; cost, $16,000; owner, Robert Lindsey, 2325 First Ave.; architect, J. H. Valentine; builder, John Hutchins.

Lewis St., No. 144, five-st'y brick tenement, tin roof; cost, $ 6,500; owner, Edward Donnelly, 346 East Third St.; architect, Bernard McGuirk.

Columbia St., s w cor. Rivington St., five-st'y brick tenement and store, tin roof; cost, $16,000; owner, Frank M. Weiler, 203 West One Hundred and Twenty-third St.; architect, Julius Boekel.

East Seventeenth St., No. 245, four-st'y brick dwell.; cost, $35,000; owner, Sidney W. F. Webster, 243 East Eighteenth St.; architect, Richard M. Hunt.

Tinton Ave., n e cor. Clifton St., two-st'y frame dwell., tin roof; cost, $3,000; owner, Agnes Decker, 841 Forest Ave.; architect, W. W. Gardiner; builder, P. P. Decker.

ALTERATIONS. — *East Twenty-fifth St., No.* 113, three-st'y brick extension; cost, $8,000; owner, Margaret A. Goodridge, 127 East Twenty-fifth St.; architect, A. E. Fountain; builders, J. L. Murtha and A. E. Fountain.

State St., No. 6, one-st'y brick extension and internal alterations; cost, $5,000; owner, Jos. F. Chattelin, 116 East Sixteenth St.; architect, A. B. Ogden.

West Thirty-sixth St., No. 43, raise attic story and internal alterations; cost, $12,000; owner, S. B. Smith, 2 Nassau St.; architect, B. Silliman, Jr.; builders, Richard Deeves and Smith & Bell.

East One Hundred and Twenty-fifth St., No. 165, two-st'y brick extension on front and a one-st'y brick extension on rear, also interior alterations; cost, $9,500; owner, Henry Schile, on premises; architects, Rentz & Wirz; builder, not selected.

Philadelphia.

HOUSES. — Messrs. Longcope & Snyder are about to erect at cor. Fifteenth and Diamond Sts., (Carlisle Park), 21 brick houses; from plans by Hazlehurst & Huckel.

Spruce St., No. 1823, H. C. Groome, Esq., will erect a four-st'y brick residence; from plans by Hazlehurst & Huckel, architects.

BUILDING PERMITS. — *Kensington Ave.*, n of Cambria St., two-st'y dwell., 16' x 35'; Alexander Adair, owner.

Broad St., n e cor. Tioga St., one-st'y addition to chapel, 32' x 36'; Benj. Walker, contractor.

Haines St., w of Stenton Ave., two-st'y dwell., 16' x 42'; W. Garvin, contractor.

North Sixth St., Nos. 2116 *and* 2118, 2 two-st'y stores, 14' x 40'; H. M. Martin, contractor.

Ogden St., Nos. 1328 *and* 1330, three-st'y stable, 42' x 78'; Jos. Arthur, owner.

Sixteenth St., s of Page St., 4 three-st'y dwells., 3, 15' x 54'; 1, 28' x 30'; W. C. Lea, owner.

Watkins St., No. 311, one-st'y stable, 36' x 57'; W. W. Bozorth, contractor.

Canal Bank, Manayunk, one-st'y addition to factory, 18' x 80'; J. Stelwagon's Sons.

Wilson St., No. 2119, two-st'y dwell., 16' x 20'; Jas. B. Simpson, owner.

Locust St., No. 3531, three-st'y dwell., 17' x 55'; W. E. Culm, contractor.

Nineteenth St., s of Wharton St., two-st'y dwell., 16' x 40'; Lewis Simpson, owner.

Wyoming St., n e cor. Haverford St., fire truck-house, 40' x 80'; F. H. Vodges, contractor.

Hunter St., Nos. 1023 *and* 1025, five-st'y smith shop, 36' x 78'; A. A. Catanach, contractor.

Vine St., n s, e of Sixty-fifth St., two-st'y dwell.; 15' x 42'; Fulton & Irwin, contractors.

Fortieth St., e s, s of Lancaster Ave., two-st'y dwell., 14' x 40'; Fulton & Irwin, contractors.

North Seventh St., No. 864, third-st'y addition to club-house, 20' x 40'; J. McCarthy, contractor.

McKean St., cor. Gerhard St., 2 two-st'y dwells., 16' x 42'; Chas. H. Clark, owner.

Poplar St., n s, w from Twenty-seventh St., 12 three-st'y dwells., 1, with store, 15' x 37'.

Third St., w s, n of Cumberland St., one-st'y box factory, 32' x 70'; David H. Davidson, owner.

St. Louis.

BUILDING PERMITS. — Ninety-three permits have been issued since our last report, of which 21 are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

Wm. Kennedy, 3 adjacent two-st'y brick dwells.; cost, $8,000; J. D. Fitzgibbons, contractor.

Otto Moser, 2 adjacent two-st'y brick dwells.; cost, $7,300; Jungenfeld, architect; Charles Wehking, contractor.

H. Belz, 2 adjacent two-st'y brick dwells.; cost, $7,700; Dette, architect; Geo. M. Roeder, contractor.

R. H. Newberry, two-st'y brick dwell.; cost, $2,500; R. H. Newberry, architect and contractor.

August Held, two-st'y brick dwell.; cost, $3,000; Jungenfeld, architect.

Bowman & Son, 2 adjacent two-st'y brick dwells.; cost, $8,000; G. W. Pike, architect; sub-let.

Peter Dietz, two-st'y brick dwell.; cost, $3,200; N. Risse, contractor.

A. Demuth, 3 adjacent two-st'y brick dwells.; cost, $9,000; Helm Bros., contractors.

Delaney (owner), Carpenter (agent), two-st'y brick dwells.; cost, $9,100; Beinke, architect, M. Kirkwood, contractor.

J. F. Hackstaff, two-st'y brick dwell.; cost, $2,780; J. E. Truitt, contractor.

J. E. Truitt, two-st'y brick dwell.; cost, $2,800; J. E. Truitt, contractor.

Geo. Streit, two-st'y brick dwell.; cost, $2,500; Geo. Streit, contractor.

Geo. P. Whitelaw, four-st'y brick store; cost, $13,000; A. Grable, architect; B. F. Stotlemeyer, contractor.

Fred. Geisler, two-st'y brick dwell.; cost, $6,000; J. B. Legg, architect; M. Kirkwood, contractor.

Mrs. M. Carlisle, two-st'y brick dwell.; cost, $6,500; J. B. Legg, architect; J. Mahon, contractor.

Mrs. H. Herbeck, two-st'y brick dwell.; cost, $4,500; Stricher, contractor.

J. Cannon, two-st'y brick dwell.; cost, $6,000; Cairns, architect; A. Redmon, contractor.

St. Louis Mutual House Building Co., No. 3, two-st'y brick dwell.; cost, $3,100; Mortimer, architect; P. Mulcahey, contractor.

General Notes.

AMHERST, MASS. — Bartlett Bros. of Whately have the contract for building Prof. Henshaw's new house on Orchard St.

CHIPPEWA FALLS, MINN. — The contract for the new city buildings has been let to a home contractor for $15,000.

DES MOINES, IO. — Burnham & Root have plans ready for a new depot-building for the Chicago, Burlington & Quincy Railroad Co., 50' x 100', to be built here.

DECATUR, TEX. — The town has sold at par $15,000 worth of bonds issued by the municipality for the construction of a city-hall and high school building.

HOLYOKE, MASS. — Chase Bros. are to build a brick block to contain 4 tenements of 8 rooms each, on the lot north of Dr. N. B. Chase, on Mapleton St. The plans are being drawn by T. W. Mann.

LONSDALE, R. I. — The corner-stone of the new Christ Church was laid last week.

MACON, GA. — Statement of buildings now in progress, or about to commence under the charge of Alexander Blair, architect, Macon, Ga.: —

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A SCULPTOR of note in Boston died a few days ago, at an age when most artists have all their best successes yet before them, and Martin Milmore's native genius, joined with his persevering industry, gave promise of a future still more brilliant than his past. The two Milmore brothers, of whom the elder, Joseph, a sculptor of no mean talent, still survives, were brought to this country from Ireland by their widowed mother about thirty years ago. Both of them went through the ordinary course of a Boston school-boy's life, but Martin's natural bent showed itself even in childhood, and at the age of fifteen he was placed in the studio of Thomas Ball, where he kept himself constantly busy, studying, and practising the knowledge which he acquired. Most of his time for many years was devoted to portrait sculpture, but he found opportunity for the production of an ideal bas-relief, and a patriotic statuette, besides executing for the Boston Horticultural Association three huge granite statues, of Flora, Ceres and Pomona, which adorn the front of the building belonging to the Association. Although open to much criticism, these statues have perhaps all the character that committees who assign such inane subjects to artists have a right to expect; and they brought Mr. Milmore many other public commissions, among them being three Soldiers' monuments in different parts of Boston, and others in Fitchburg, Massachusetts, in Erie, Pennsylvania, and in Keene, New Hampsnire.

ONE of the largest and most modern hotels in the South, the Kimball House at Atlanta, was totally destroyed this week by fire. The first discovery of the fire was at five o'clock on Sunday morning, but it soon increased beyond control, and the manager of the hotel ordered that the guests should be awakened. This order was effectually carried out, the servants breaking open the doors of the rooms; and in twenty minutes from the alarm the house was emptied. Forty minutes afterward the building was a heap of ruins. Some of the daily papers congratulate the guests on their "favorable opportunity" for escaping, and if the fire had originated anywhere but in the rear of the building, the consequences might have been much more serious, but it may be questioned whether people awakened from their soundest sleep by the bursting in of their doors, to rush precipitately into the street, leaving their clothes and baggage behind them, might not think with regret of the still more "favorable" conditions, in case of fire, which would be presented by a hotel built as most of those abroad, and a few in New York, are, and as all hotels should be. The structure is said to have cost six hundred thousand dollars, and to have contained one hundred and twenty thousand dollars' worth of furniture, and as the insurance amounted to little more than one-tenth of the value of the whole, the owners will have gained six hundred and fifty thousand dollars' worth of information about combustible building, which we hope they will impart to their friends upon occasion.

WE find mention in one of our exchanges of two remarkable cases of lead-poisoning which have occurred in France lately. In the more recent one a small village was attacked by an inexplicable and fatal disease, presenting symptoms similar to those caused by lead-poisoning, but having, apparently, a different origin, since no evidence could be discovered to show that lead had been taken into the system of any of the patients. A more thorough investigation, however, threw suspicion on the bread used, and the premises of the village baker and miller were subjected to an examination, which resulted in the discovery of a cracked millstone, repaired, by the economical ingenuity of the miller, by filling the crevices with melted lead, which was in course of time ground down and mingled with the flour. In the other case, which occurred in Paris, a baker had used for heating his oven, which was one of the old-fashioned brick variety, some refuse boards, which had been painted with white lead; and particles of the metal, apparently penetrating into the joints of the brickwork so far as not to be reached by the broom used for sweeping out the oven, had clung to the soft dough, and were distributed with the bread.

THE *Scientific American* mentions the decline in the price of copper, as likely to lead to the increased use of that metal in building. At present, the material for a copper roof costs, at the outset, only about twice as much as tin, and as the latter must be repaired and painted about once in three years, and in fifteen or twenty years must be renewed altogether, the copper, which never needs painting, and is practically indestructible, is much the cheaper material in the end. There are in Boston many copper roofs, put on about forty years ago, which show no signs of deterioration; and the metal is still much employed in that city for cornices, gutters and rain-water pipes, as well as for covering bay-windows, and in many other ways, in place of galvanized-iron, which is much inferior in beauty and durability, and not very much cheaper. The copper has the additional advantage of needing no paint, so that the delicate lines of artistic work are in no danger of being filled up, and the metal increases rather than diminishes in beauty, by the slow formation of a bluish-green patina over it. For flashings, as well as other portions of roof-work, copper is much superior to zinc or tin, and with the aid of a certain amount of lead, the most difficult problems in roofing can be successfully and permanently solved.

THE *Sanitary Engineer* mentions a case of a church, planned by an architect, but carried out without his supervision, in which his careful arrangement for the supply of fresh air, to be heated by furnaces in the basement, and withdrawn after use by an extraction chimney, heated by carrying up a pipe flue inside of it, was changed, under the direction of the building-committee, to a system without any provision whatever for the withdrawal of foul air; and subsequently, when experience had shown the impossibility of getting any warm air into the church without making a way for the cold air to get out, was modified by cutting holes in the floor and inserting registers, which were placed in communication with the cold-air box of the furnace; so that the body of air in the building simply circulated to and from the basement, renewing its warmth at each passage through the furnace chamber, but growing constantly more and more foul. The credit of this delectable arrangement is, we are quite sure, due to the furnace-man, rather than the building-committee. Not only is this method of increasing the heating efficiency of a poor furnace well known in that trade, but nothing is more common than to see the cold-air inlet in dwelling-houses made with a door opening into the cellar, for the express purpose of taking air from the cellar, instead of from the outside, in the coldest weather; and we know, indeed, districts in which there is generally no other air-supply to the furnace. The effect upon a person with weak lungs or nerves of being compelled to pass a winter in a house hermetically sealed by double windows, and furnished, so to speak, with a single charge of air for four months' use, may be imagined. There can be little doubt that many lives are annually sacrificed by this dangerous practice.

WE have observed with grief that the quoted price of shares in the Keely Motor Company has fallen of late to about one-third of that for which they were sold soon after the publication of those glowing letters from newspaper correspondents, describing a certain locomotive in process of

construction for the application of the principle; and we can hardly avoid the inference that the "theory of molecular vibrations" shows signs of being unequal to the task of hauling railway trains. We can, however, encourage the stockholders in this great enterprise to hope that if their enthusiasm for molecular vibrations should meet with final disappointment, another opportunity will before long be offered them for making a permanent investment of their spare funds, and, at the same time, for gaining additional financial experience. In the same city which produced the great discoverer of the art of letting loose molecular vibrations dwells a person who has discovered a "new mechanical law," "the application of which will enable him to increase a hundredfold the power of any machine, from a clock to a steamship, without using an ounce more fuel than usual, or driving the motive power any faster than ordinarily." A reporter of the *Philadelphia Record*, who waited upon the proprietor of this important invention, learned that the secret "could not at this time be disclosed," but was informed that the application of the new law "consisted in combining the action of the screw, the inclined plane, and one other form," the nature of which must not be further explained. It is, at least, something to be grateful for that we know two-thirds of the mystery. Hitherto, the combination of a screw and an inclined plane has hardly been thought of as an efficient mechanical device, and its application to clocks and steamboats is, we venture to say, wholly new; but, the way once pointed out, it cannot be doubted that the search for the remaining element of the grand discovery will be pursued with vigor.

THERE is a great pleasure in gathering from the pages of *Le Génie Civil* those intelligent and impartial statements of the progress of the Panama Canal, which, for some reason, we seek in vain from the daily newspapers of the country most nearly interested in that great undertaking. The last number of that most excellent technical journal contains an account of the work already accomplished, and of the means at hand for use in future operations; the writer, who seems perfectly familiar with the subject, beginning with a short history of the most disastrous mistake which has yet been made on the Isthmus, the foundation of the ill-fated city of Gatun. It seems that the pioneers of the Canal Company, who were sent to prepare wharves and warehouses for the accommodation of the business necessary to the enterprise, found that of the six miserable piers of the port of Aspinwall, not one was available for their purpose, and were obliged to look for a suitable place for constructing new ones. The island of Manzanillo, on which Aspinwall is built, consists mostly of a deep and spongy marsh, the town, with the present wharves, occupying all the ground firm enough to build upon, with the exception of a narrow strip on the north side, at some distance from the town, and much too small to accommodate the warehouses and sheds which would be necessary. Moreover, Aspinwall has the reputation of being perhaps the most unhealthy city in the world, and the engineers felt themselves bound to care for the lives of the army of people who were to follow them, by selecting the most salubrious spot for their work which could be made otherwise suitable. As the island of Manzanillo was considered thus out of the question, there was no alternative but to seek a landing-place up the River Chagres, near the mouth of which the island lies; and about eight miles inland, M. Blanchet, the engineer in charge, found a little bay surrounded by hills, which seemed to him admirably adapted for the creation of an industrial town under much more favorable auspices than among the reeking swamps of Aspinwall. This place was Gatun. Except in one spot, the river was deep enough to allow steamers to reach the wharves, and the advantages of the new harbor seemed so great that a dredge was set at work to cut a channel, while the high ground overlooking the river was staked out and graded, and active building operations begun. No sooner was the ground broken than fevers attacked the workmen, who, it must be remembered, were for a time obliged to live and sleep either in the forest or in their unfinished houses. Some of the men died, and a panic seized the remainder; and the news of the unfortunate undertaking reaching the directors of the Canal Company, peremptory orders were sent that Gatun should be abandoned. Subsequent experience has shown that M. Blanchet's choice of the place was justified, but circumstances were then against him, and although he obeyed the order, he did not long survive his disappointment and mortification.

AS Gatun and Aspinwall are the only places on deep water which are touched by the Panama Railway, there was no choice, after the abandonment of the first, but to return to the other; and to make up for the deficiency of firm land available there, it was decided to fill in a tract on the southwest side of the island, large enough to give room for all the necessary buildings, and shaped to form a kind of breakwater, projecting into the harbor in such a way as to protect the mouth of the canal, which lies immediately behind it. The filling of this tract will require about four hundred thousand cubic yards of material, and until this is completed the administration of the canal is obliged to occupy temporary quarters in the town. It would seem most economical to combine the work of filling with that of excavation, by using the earth dredged from the mouth of the canal for building up the neighboring bank; but the material in this portion is mostly mud, filled with fragments of coral, and the healthfulness of habitations built upon such a foundation appearing doubtful, it was decided, in place of this, to bring clean, dry earth from the hills of Mindi, which are traversed by the canal about three-quarters of a mile from Aspinwall; and the first operations of excavation were accordingly assigned to that place. Stone for revetting the water-front of the new territory is obtained from a quarry on Kenny's Bluff, at a little distance from the city, and the work of transferring the Mindi Hills to the harbor of Aspinwall has been rapidly carried on. Between the new made land and the proposed mouth of the canal is the estuary known as the Folks River, which separates the island of Manzanillo from the shore; and the dredges of the Company are engaged in deepening this to form a practicable channel; while the excavation of the portion of the canal itself extending from the Folks River to Gatun is included in the contract made with Messrs. Huerne and Slaven, of San Francisco. The quantity of material to be removed from this portion of the canal is estimated at six millions of cubic metres, or nearly seven million yards, and according to the contract with Messrs. Huerne and Slaven, the whole should be completed in about two years and a half; but the observations of the correspondent lead him to doubt whether the terms of the agreement will be complied with.

MR. WYATT PAPWORTH, reviewing, in the *Builder*, Mr. R. F. Gould's "History of Freemasonry," brings forward some interesting information in relation to the church-building of the Middle Ages. The author of the History of Freemasonry has rather a mean opinion of that time, and warns his readers against "the exaggerated notions current concerning the piety and devotion" of the Middle Ages, "and the enormous cost and sacrifice required for the erection of mediæval ecclesiastical structures," saying that although great sums were spent upon a few important buildings, the outlay, even upon these, was spread over so long a period as to make the annual cost comparatively small. Thus, Lincoln Cathedral, which is estimated to have cost a sum equivalent to about five million dollars of our present money, was nearly a hundred and fifty years in building, so that, if equally divided, the annual expense of carrying on the structure would have been only about thirty-five thousand dollars; and the total value of all the ecclesiastical buildings in England at the time of the Reformation, which he estimates at about three hundred and twenty-five million dollars, represented the accumulated outlay of four hundred years. To these plausible representations Mr. Papworth makes the reply, which will please all lovers of mediæval art, that the fact of a hundred years having elapsed between the commencement of a building and its completion is by no means an indication that the work was carried on regularly throughout that period; on the contrary, the records show, not only that operations were often discontinued for long periods, but also that in many cases buildings sufficiently completed for occupation were entirely remodelled and rebuilt, sometimes several times over, before reaching the form in which they have since remained. In France the evidence of the widespread enthusiasm for ecclesiastical building which appeared at the end of the twelfth century is far more plain than in England. To say nothing of the convincing testimony of the buildings themselves, we know that the battle of Creçy, in 1346, gave the signal for the abandonment of all peaceful arts, not to be resumed again for a hundred years, and all the splendors of the French cathedrals are due to a movement which had nearly spent its force within a single century, and in less than two centuries had disappeared entirely.

WATER-CLOSETS.[1] — XVII.

SHORT-HOPPER CLOSETS.

THIS type may be conveniently treated by grouping together those which have a bottom outlet in distinction from those which have a side outlet.

Mr. W. P. Gerhard has seen proper in his book,[2] to classify a number of the short-hopper closets, some of which have their outlet at the bottom and others at the side, under the name of "Wash-out Closets." I think it simplifies the matter to place them, where they certainly belong, in the class of hopper-closets. Mr. Gerhard himself says: "A wash-out closet is in fact only a modified and improved form of hopper."

Thomas Smith's Closet. — The earliest patent for a closet of this type was issued by Great Britain to Thomas Smith, in 1842. The patentee claims as a novelty the branch from the supply-pipe (the closet being supplied from a tank), which is connected with the bottom of the trap. This branch from the supply-pipe is intended to thoroughly wash out any matter which might be in, or would otherwise remain in the trap. In this closet the trap, instead of being circular in cross-section, is rectangular. It has an inspection-cover on the crown of the trap, and the water is spread over the bowl by means of a fan.

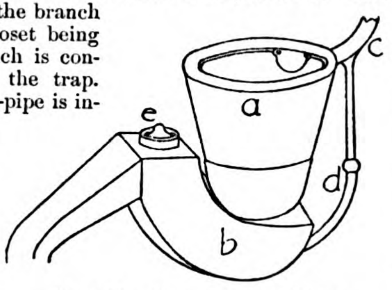

Fig. 170. — Thomas Smith's Closet.

a, Bowl. *b*, Trap. *c*, Supply-pipe. *d*, Branch to bottom of trap from supply-pipe. *e*, Inspection-hole.

French Short Hopper. — F. Liger[3] tells us that this closet (Fig. 171) was designed in Paris, in 1872, for use in public places, being modelled according to English patterns. He states "that the gases from the sewer are cut off by a siphon-trap." In public places where this closet had been introduced, it was made to operate by opening the doors. The closet is arranged so it can be supplied with water, either by means of a supply-valve or from a tank. The peculiarities of this closet consist in the branch from the main supply-pipe for flushing the trap, and in the partition of the trap being so placed as to form a screen, and hide, rather than get rid of, any disagreeable matter that might possibly remain.

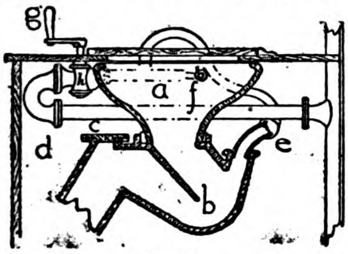

Fig. 171.

French Short-Hopper Closet.

a, Bowl. *b*, Trap. *c*. Inspection-hole. *d*, Supply-pipe. *e*, Branch from supply-pipe connected with bowl. *f*, Opening into bowl. *g*, Lever opening supply-valve.

Hellyer's "Vortex" Closet. — S. S. Hellyer, of London, received patents from Great Britain in 1878, and from the United States in 1880, for a short-hopper closet which he has named the "Vortex." The novelty of this closet is based on the shape of the bowl and flushing-rim. The flushing-rim is so arranged as to throw a strong jet of water directly into the bottom of the bowl, this being also the bottom of the trap, by this means forcing whatever water or foreign matter there is through the trap into the soil-pipe. It will be seen by the illustration (Fig. 172) that it is intended in some cases to have a branch from the main supply-pipe entering the bottom of the trap, as described in the Smith closet (Fig. 170). There are openings in the flushing-rim around the sides of the bowl, by which the surface of the bowl is washed. The trap is properly vented. This branch connecting with the bottom of the trap is unnecessary in the better forms of short-hopper closets, where they are flushed from a tank, through a properly-arranged flushing-rim.

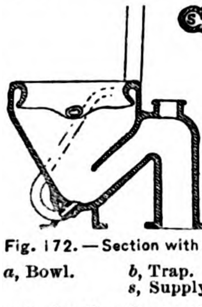

Fig. 172. — Section with Jet.

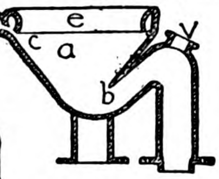

Fig. 173. — Section.

Fig. 174. — Perspective.

Hellyer's "Vortex" Closet.

a, Bowl. *b*, Trap. *c*, Opening for jet of water. *e*, Flushing-rim *s*, Supply. *v*, Vent.

Wm. Smith's Closet. — The "Siphon-Jet" closet, manufactured in San Francisco, and patented in 1876 and 1878 by Wm. Smith, also depends upon the branch from the supply-pipe to cleanse the trap and force the waste matter into the soil-pipe. This closet is furnished in one piece of earthenware, or with an earthenware bowl and iron trap. It is connected with a tank, or may be connected directly with the supply-pipe, the flush being governed by a patent valve.

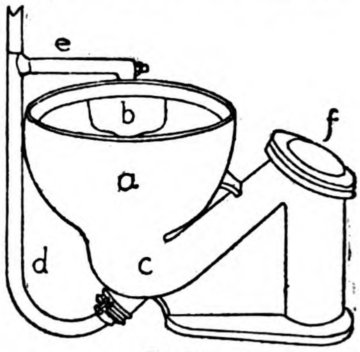

Fig. 175.

Wm. Smith's Closet.

a, Bowl. *b*, Fan. *c*, Trap. *d*, Branch supply-pipe. *e*, Supply-pipe. *f*, Inspection-hole.

English Closet. — Baldwin Latham describes a short-hopper closet in which the flushing-rim is connected with the bottom of the trap. He says: "this form of closet with bye flushing-pipe was introduced to remedy the defect, which, as already referred to, attends the hopper-closet, that is the cleansing of the trap after the use of the closet." This evil mentioned by Latham has been remedied by properly arranged and devised water-supply and flushing-rims, which are now manufactured as a part of the better short-hopper closets.

Closets manufactured as described, with a branch from the supply-pipe connecting with the bottom of the trap, would be peculiarly susceptible to the evil which it is claimed sometimes takes place when the supply-pipe is attached directly to the bowl of the closet, a valve only intervening; viz., the liability of foul air or filthy water being drawn from the closet when a faucet is opened on some floor below, the supply-valve of the closet being open at the same time. For the reason stated care should be taken always to connect closets of this kind with a separate tank or cistern when — and they are simple and useful — they are used.

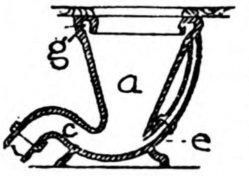

Fig. 176. — English Closet.

a, Bowl. *c*, Trap. *e*, Branch-supply. *g*, Flushing-rim.

Hellyer's "Short Artisan Hopper."—This closet is composed of two pieces of earthenware, the bowl and trap, which are joined together by means of clamp-screws, putty or cement being put into the joint. The bowl of this closet is oval in shape, with its back edge nearly straight, so the bowl need not become foul by fæcal matter dropping on it. This closet has a flushing-rim which serves its purpose well, and the trap is properly vented at the crown. In connection with his patent flushing-rim, Hellyer arranges an annular rubber band, in a groove made for the purpose on the top of the flushing-rim. The seat of the closet is intended to fit down on this band and thus prevent smells or cold air from coming into the room from beneath the seat. It is the custom in England to have the "tell-tale" pipe from the closet-safe run through the wall into the outer air. A draught through this pipe might become disagreeable to a person occupying the seat of the closet. This closet has an opening at the crown of the trap, to which a vent must be attached, and in use it is simple and effective.

Fig. 177.

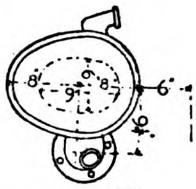

Fig. 178.

Hellyer's Short Artisan Hopper.

Fig. 179.

Flushing-Rim.

i, India-rubber ring. *c*, Flushing-rim.

Demarest's Short-Hopper Closet. — The J. L. Mott Iron Works manufacture a short-hopper closet which in appearance and in its manner of working is almost identical with the Hellyer short hopper. The novelty consists in the manner of connecting the bowl with the trap, and the trap with the vent-pipe, and in the Demarest patent flushing-rim (see Fig. 179). The top of the trap and the bottom of the bowl are both encircled by

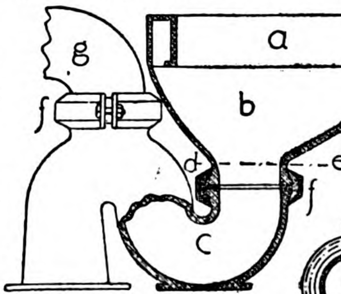

Fig. 180. — Section.

Demarest's Short-Hopper Closet.

Fig. 181.

Section through line *d-e*.

a, Flushing-rim. *b*, Bowl. *c*, Trap. *g*, Vent-pipe. *f*, Collar or clamp.

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[1] Continued from page 65, No. 398.

[2] *House Drainage and Sanitary Plumbing.* Wm. Paul Gerhard, New York, 1882.

[3] *Fosses d'Aisance, Latrines, Urinoirs, et Vidanges.* F. Liger, Paris, 1875.

a projecting ring or flange, over and around which a metal collar fits. This collar when bolted makes a very strong joint. The space between the collar and the joints has to be filled with putty or cement. The coupling for the vent-pipe is a two-inch zinc-coated iron quarter-bend, which has a hub on the free end, into which the spigot of the vent-pipe can be caulked. If a lead vent-pipe is to be used, a brass coupling must be connected with the trap, instead of the iron one described.

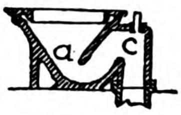


Fig. 182.
Roe's Closet.

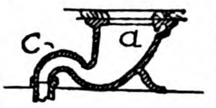


Fig. 183.
Straight-back Hopper.

a, Bowl. b, Trap. c, Vent.

Roe's Closet. — Baldwin Latham, in his work on sewerage, illustrates two short-hopper closets. Mr. Latham states that in this closet exists the first instance of a vent-pipe being properly placed on the trap. The reader of the foregoing articles will probably recollect that the vent to the trap was used or invented in connection with the Wilkins closet forty years ago. Figure 183 is shown as an example of this class, in which the back is made straight, so fæcal matter will drop directly into the trap, and not adhere to the sides of the bowl.

Carmichael "Wash-down" Closet. — Mr. W. P. Buchan, in 1879, invented a closet of this class, which he informs us is furnished in one or two pieces of earthenware, the joint being made above the water-line.[1] This closet is supplied with a flushing-rim to wash the sides of the bowl, and also with a jet of water which strikes the water in the bowl so as to force it through the trap. The trap has an inspection-hole on top. This closet seems to have deservedly met with success in England, where there seems to be a tendency, which should be followed in our country, to adopt short-hopper closets in preference to all styles or patterns. Mr. Buchan calls the short-hopper closets which have an outlet at the bottom wash-down closets, while those which have an outlet from the side he calls wash-out closets.

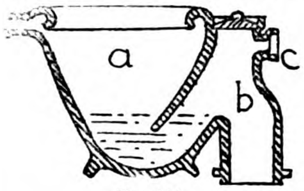


Fig. 184.
Buchan's "Carmichael" Closet.
a, Bowl. b, Trap. c, Vent.

A. G. Myers's "Niagara" Closet, No. 2.— A short-hopper closet has been quite recently introduced into the market by A. G. Myers, of New York. This closet is made in one piece of earthenware, or it is furnished with a part of the trap separate from the bowl. It is flushed by carrying the water-supply through or against a fan. The bowl of this closet is waved or corrugated in circles parallel to the floor. The idea is that the water, coming in contact with the inequalities of the surface, will wash the bowl more thoroughly than would be the case if it were smooth. It appears to me that the under side of the wavy surface would not be washed at all, and if this is the case, more harm than good would be done by making a bowl in this manner. The trap in this closet has a hub for a vent-pipe, which is placed, in accordance with the suggestion of Hellyer, on the side of the trap nearer the soil-pipe than is usual. This position is intended to prevent foul matter from being forced up into, and lodging in the vent-pipe. It is claimed that the vent-pipe is sometimes made useless in this manner.

Fig. 185.—"Niagara" No. 2.
a, Corrugated Bowl.
b, Fender. c, Fan.
d, Trap. e, Vent.

Owens's Closet. — Henry Owens, in 1878, invented a closet which is made in one piece of earthenware, and is designed so as to have either two traps or a trap and an offset between it and the soil-pipe. The traps, and also the offset, have openings for vent-pipes. The closet with the double trap would have a confined air-space which could only be ventilated by an inlet as well as an outlet pipe for the air. I think as there is nothing gained by the double trap, the closet with the trap and offset is to be preferred.

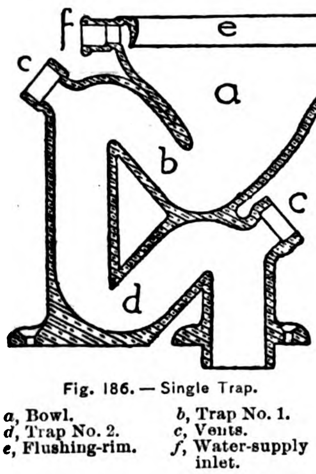


Fig. 186. — Single Trap.

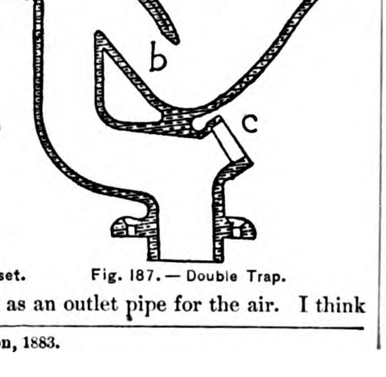


Fig. 187. — Double Trap.

a, Bowl. b, Trap No. 1.
d, Trap No. 2. c, Vents.
e, Flushing-rim. f, Water-supply inlet.

Owens's Closet.

Waring's Siphon Closet. — This closet, which was designed by Mr. Geo. E. Waring, Jr., of Newport, R. I., has a very deep water-seal trap at the bottom of the bowl. The closet is set over a second trap, which is placed beneath the floor. In the lower trap a weir is formed. The contents of the bowl are siphoned out every time the bowl is used. From its shape it is necessary that this closet should be filled to within a short distance of the top of the bowl, before the necessary siphon action which empties the bowl can take place. This excessive amount, or, more properly speaking, the height to which the water rises in the bowl, is exceedingly disagreeable sometimes. The trap below the floor is in shape or form very much like the objectionable D-trap. The first trap by reason of its siphon action cannot have a vent-pipe in the usual position. The closet is gracefully formed in one piece of white earthenware.

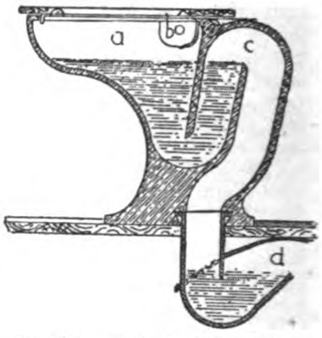


Fig. 188. — Waring's Siphon Closet.
a, Bowl. b, Fan. c. Siphon.
d, Trap No. 2.

Boyle's "Tidal Wave" Closet. — In the year 1882 a closet with the double trap was invented by J. E. Boyle. An air-pipe runs from the space between the two traps, up and through the tank. This air-pipe is governed by a valve which opens only when acted on by a pressure from below, so this vent-pipe would not interfere with forming of the partial vacuum, which would be necessary before the closet could be emptied by siphon action. When two-thirds of the service-box has run off, the vacuum is broken and the remaining third fills the bowl. The bowl and its double trap is manufactured in one piece of earthenware. The lower trap is properly ventilated. The closet must be supplied from one of Boyle's patent cisterns or tanks.

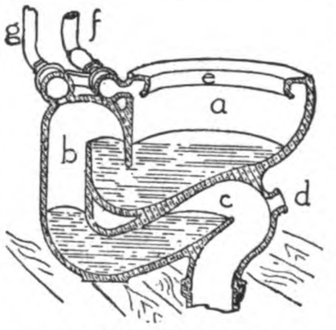
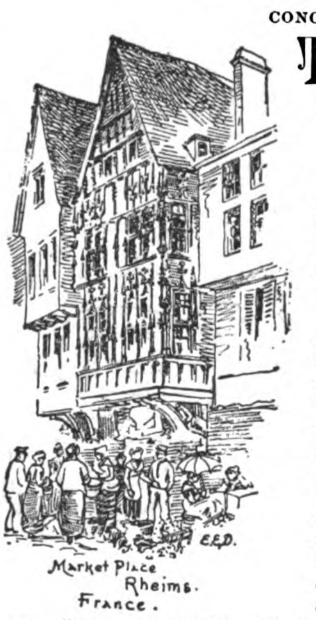


Fig. 189. — Boyle's Closet.

William Bunting, of New York, received patents from the United States, in 1878, for a closet in which the siphon action is created by a piston which works in a chamber situated above the trap.

FROM BAYREUTH TO RATISBON. — NOTES OF A HASTY TRIP.[2] — XIII.

CONCLUSION.



THE interior of the Ratisbon Cathedral is rich in carvings, sepulchral monuments, and statues. A prominent object is a well in the south transept with a richly-carved basin and canopy of late Gothic work. The treasures of the sacristy are very numerous and very varied, beginning with a carved ivory comb of Celtic workmanship, and showing specimens of the best minor art of all later epochs.

The gem of the collection is an enamelled reliquary which seemed to me the most beautiful piece of goldsmith's work I had ever seen. It was in the shape of a sarcophagus with a steep roof. The framework and an elaborate cresting along the top were of delicately worked gold in the style of the fourteenth century, and the sides and top were of enamel, shading from deep purple into blue, and studded with golden figures of stags. Small windows, so to say, of crystal allowed the relics to be seen. This splendid object, for which the Chapter has received more than one large offer from collectors, was found some years ago together with other valuable little works in a forgotten box in some subterranean room connected with the cathedral.

A small door leads from the north side of the apse into the old church-yard full of interesting monuments, and thence we reach the cloisters, which date chiefly from the fifteenth century, and show remarkable details of early Renaissance work. Some of the windows, round-headed with simple cusped mullions but no tracery, are framed in elaborate work which seeks to imitate the clustered window-shafts

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[1] *Plumbing.* W. P. Buchan, London, 1883.

[2] Continued from page 64, No. 398.

of Gothic days, by means of small swollen columns of classic design, interspersed with statues, and canopies, and mouldings of the most curiously composite sort. Opening from the cloisters is a very ancient little chapel, commonly called the "Old Cathedral," in the idea that it was the first structure on the Episcopal foundation. Its truer title is the Chapel of St. Stephen. A church is known to have been built on this spot in very early Christian, even Roman times. By some this is thought to be the original structure, while others hold that that was destroyed toward the end of the ninth century, and that this is merely a duplicate of its form. In any case it gives us one of the very oldest specimens of ecclesiastical architecture north of the Alps. It is extremely solid in spite of its small size. Two large, round-arched recessed compartments, each with a window in its head, make up the longer side. These compartments are divided by pilasters, with capitals too simple to throw any light on the date of the building. The apse is a shallow semicircular recess, and the roof is formed of two quadrilateral vaults without ribs, evidently later than the walls. An altar raised on three steps is extremely curious; being a plain, hollow block of stone broken near the base of its main side by a row of round-arched openings which seem to imitate transomed windows, and which allow the contained relics to be seen. But a few steps away is another odd little structure, the Chapel of All Saints: its plan is typically Byzantine — a square, from which opens on each side a semicircular recess almost equal in breadth to the whole width of the chapel. These are crowned with tiled roofs, and over the central structure rises a great eight-sided lantern, with its steep roof also tiled. An early Romanesque frieze of little semicircular arches with pilasters at the angles surrounds the tower, and a similar motive runs around the bays as well. From the outside it is thus an extremely beautiful, though simple little building. Inside it is perfectly plain without detail of any kind, but with traces of very old frescoes on the wall. It also has an altar of more usual shape, but still very early — a slab supported by a pier in the centre, and by columns with die-shaped capitals at either corner. It was probably a sepulchral chapel.

Not far from the cathedral, on the same little square, indeed, is the so-called "Old Parish Church of St. Ulrich," a most peculiar and interesting specimen of the transition style, dating from the middle of the thirteenth century; it seemed now to be a museum of antiquities, and was closed on the Sunday when we tried to see it. So all we knew of its interior was by looking through the windows, which process revealed, however, many noteworthy things. The plan of the church is a square; but by means of aisles enclosed so as to form side-rooms with galleries above, rather than true aisles, the nave obtains a length of twice its width. Round pier arches support the galleries; but those above the galleries are rather flatly pointed, and over these again rises the plain wall, characteristic of earlier days; broken only by small round-arched windows high up under the roof. The east end shows a very tall and slender pointed arch rising quite to the ceiling, beyond which is a narrow apse, finished with a single, tall pointed window, with an embryo rose above its two lights. On either side of the central arch is a round arch, rising high above a square raised gallery or rather *loge*. The main pillars are octagonal, and all the capitals show early Gothic foliage. The whole interior shows a curious combination of forms, as well as a plan unlike anything I had previously seen. The ceiling is flat, and outside the doors are round-headed with Gothic detail, while the windows are pointed. The exterior sculpture as well as the details throughout are very good. The ancient so-called Roman tower rising close by forced the apse to receive a square end, which further adds to the architectural peculiarities of this most interesting building. The treasury of the church contains a mass of valuable objects, among them a bishop's staff of buffalo horn, decorated with bands of true Celtic ornament, and dating undoubtedly from a pre-Carolingian time.

Still another very ancient church is the "Old Chapel." The first structure was erected in pre-Carolingian times, and the present one was built by our old friend the second Henry. Relics of his work are still to be traced under a mass of later additions coming down to the fifteenth century. The interior is "restored" in the Jesuit style. On the outside of the north portal are two most curious stone figures of the rudest, but most dramatic workmanship; one showing a penitent on his knees, the other an ecclesiastic weeping violently into a large pocket handkerchief; they evidently represent a confessional scene, and are locally said to portray St. Rupert and a certain Duke Theodo; if so, it seems rather hard that the only memorial of the latter in the popular eye should be this, which impresses us with a sense of his probably phenomenal iniquity. Truly, the evil that men do — or confess to — sometimes lives after them! It would take a long chapter even to hint at the interesting features, or describe the present motley aspect of any one of these Regensburg churches. Each is in itself a bewildering *résumé* of the course of architecture during many centuries, and their number is so great, moreover, that one can give but a glance to each. Our little guide-book noted twenty-three ecclesiastical buildings of great interest which still retain their ancient function; besides innumerable others which have been prostituted to secular uses and partly destroyed: relics of these, crypts or bits of cloisters, for example, are even found buried in some of the private houses of the town; and outside the city are many neighboring villages, each of which has some venerable remains to show. I cannot attempt to mention even the churches of prominent attraction. I must only give a word or two to those which are the most interesting of all; the old Scotch Church, the Dominican Church, and the immense aggregate of buildings which goes by the general name of St. Emmeran's.

The first was founded by the "Scotch" — more correctly Irish — missionaries who early played an important part in the evangelization of Germany. Of all the many similar monastic foundations in the country this one longest preserved its existence, having been secularized only in the year 1862. The structure has been injured and repaired at different times, but the larger portion of it is of the twelfth century, while the towers and the apses of the aisles are still older. The nave is flat-roofed, but aisles and apse are vaulted. The details throughout are most curious, multiform, and interesting; it does not take an unduly vivid imagination to see in many of them traces of the Celtic ornamentation which was familiar to the earlier missionaries, and became perhaps a tradition in their community. The famous north portal is one of the riddles of architecture. The shafts of the deep doorway are richly decorated; but the mouldings of the great round arch are plainly finished, though elaborately varied in section. On either side of the doorway, the wall is covered with delicately ornamented arcades; and beneath and between these, scattered on the wall with small attempt at definite architectural arrangement, are a great number of the most strange and outlandish figures, men, animals and monsters. More trouble has been taken by the labor-loving and mystery-loving archæologists of Germany to explain these sculptures than has ever been expended, probably, on any single part of any other building; but even to-day they seem no nearer to agreement, or, indeed, to definite individual decisions. Some find in the carvings a reproduction of the figures of the heathen mythology of the north; others, symbols of the philosophy of the great British teacher of the eighth century — Scotus Erigena; others again, think they are symbols of Christian doctrines or dogmas, placed here to impress the minds of the faithful before they entered the building; but these last, though their theory seems most probable in the abstract, would find it especially difficult, I think, to justify it by any explanation of the carvings. The mere architectural student, therefore, who cares more for visible forms than for hidden meanings, may content himself with admiring the rich effect of the doorway and the arcades, and marvelling at the fantastic decorations which surround them, and he may conclude, moreover, that no explanations are necessary beyond the known delight of early German artisans, which they shared with their cousins of Lombardy, in covering their work with the strange, picturesque, and phantasmal creations of their imaginations.

The Dominican Church is a most beautifully proportioned structure of the end of the thirteenth century, with tall, narrow windows, very simple in their tracery, but as graceful in shape as any I have ever seen. The building is comparatively plain throughout, as are all the churches of the poor Dominican order, but a specially interesting feature, nevertheless, is furnished by the consoles which support the vaulting ribs. These are of manifold and peculiar shapes, ranging from graceful vegetable forms to figures the most contorted and grotesque. They are especially conspicuous from the lack of other detail to divert the eye. Unfortunately, this fine interior, remarkable in Regensburg for being all of a piece, is now whitewashed throughout. Adjoining the church are the old collegiate buildings of the order, doubly interesting since Albertus Magnus taught in them for many years. His old school-room, with his professor's chair, may still be seen almost in its primitive condition, a low-ceiled, square apartment panelled with wood carved with mottoes. The carvings have been slightly restored in recent years, but the main aspect of the room is uninjured, and it is probably the oldest of the kind in Germany — the only direct evidence we have in the world, perhaps, of how the students of that century disposed themselves to receive instruction. Their rows of benches around the wall are also still existent.

And now I must give a word to St. Emmeran's, though it would be an impossible task to attempt to give any really clear idea of the extraordinary association of buildings which has grown up around the church. The Germans have a finely characteristic term which they can use in similar cases; they often speak of a *Baucomplex*, and I know of no place where the term is more literally applicable than here at St. Emmeran's; the churches, cloisters, chapels, crypts, towers, walls, court-yards, and other structures and parts of structures which are here collected together defy analysis when one is on the ground, or clear recollection later on. Some of the parts are in good preservation; others are partly ruinous and abandoned, or desecrated; others, again, were restored out of all recognition in the last century. Bits of every epoch from Roman days down to our own are heaped together in inextricable confusion. It is a hopeless labyrinth for the casual visitor, though I can imagine few more interesting tasks, had one time and knowledge, than to set oneself resolutely to work to puzzle out the medley and learn all it has to teach. The north entrance of the main church of St. Emmeran's is one of the oldest bits. We reach it through an open vestibule, or "Paradise" of the twelfth century, that replaces an earlier one destroyed by fire. Under the pointed vaults of this we find two great round-arched recesses, and in each of them a door. Curious sculptures adorn the piers, and in front of the central pier between the arches is an old stone seat, called the chair of the Emperor Henry II, but evidently even older than his time. We were unable to examine it closely, as the Kaiser's resting-place was occupied just then by a deaf old beggar woman who seemed to regard our little coin as a bribe to sit still rather than an inducement to rise, and with whom

we could not argue on account of a throng of church-goers. Illustrations show the chair to be a great T-shaped stone, the corners of the slab being further supported by two very archaic-looking lions. The back is a simple, heavy semicircular stone without the least ornamentation. Passing through this portal we find ourselves in a fine Romanesque structure, which has, however, been done up in the worst style of *Baroque* decoration. The various adjacent and connecting churches, chapels, and crypts with their endless treasures of sculpture of every sort cannot even be mentioned; but it would be a hurried account, indeed, which could omit to notice the beautiful cloisters, the finest, I think, I had ever seen in Germany. Scarcely two bays of the arcades are similar, and the various sides of the quadrangle date from various times, Romanesque and Gothic. The finest portion, I think, is that which shows transitional features, with slender pointed arches, supported on mid-wall shafts with very rich and heavy capitals. An arched doorway in this part is very curious. The recessed opening is so deep as to hold no less than eight orders of graceful columns supporting mouldings of strictly Romanesque design—with primitive forms, indeed, such as lozenges, zigzags, etc., which looked more Norman than German. The arch, however, was pointed in shape, while the naïveté and uncertain feeling of a new departure was shown by the fact that the ornamentation did not adapt itself properly to the pointed outline. It was awkwardly broken in the centre by the sharp angle of the arch, which looked, therefore, as though it had been, so to say, a round arch broken and pieced together at another angle. The late Renaissance palace of the princes of Thurn-und-Taxis is one of the most modern portions of this immense mass of varied buildings. Adjoining it, and planted right in the centre of the quadrangle formed by these lovely cloisters is a very recently-erected mortuary chapel for the family—an intrusive, ugly work which we resent as we resent no other addition to the architectural medley of the spot. If it would require a long chapter to treat of any single church in Ratisbon, it would require a whole volume to tell of the various buildings and parts of buildings which group around this church of St. Emmeran.

And then besides all the churches there are the Roman remains of the town, which are not inconsiderable, and a long series of public and private buildings, some of which have portions dating from the earliest Romanesque days. There is scarcely a house wherein old fragments of some kind are not incorporated, and we become perfectly *blasés* on the subject of the Romanesque relics upon which we pounce so eagerly in other places. Round-arched doorways greet us on every hand, towers with tiny coupled windows and immense breadths of plain brick wall, and porches, turrets and fragments of every sort. The hotel in which we stop, the famous *Goldenes Kreuz* in which so many royalists have housed, is an ancient private residence, with a tall tower that makes us think of the Italian towns. Some of these remains, especially the beautifully-carved round doorways which line the street called "of the Ambassadors," have had their details partly concealed by successive paintings; but a thousand bits of interest remain in almost uninjured condition. The Rath-Haus is a most delightful structure, with some features of extreme beauty, and of course its historical charm is great, but it is pointed Gothic of a rather late type, and so seems very recent in this hoary town. The great hall has a splendid range of windows along one side, which makes the chief feature in the outside view as well, and it contains many beautiful examples of ancient needle-work and weaving. But one grows tired of hinting at things which cannot be described — grows tired of trying to remember things which could only be glanced at, and not properly appreciated amid the mass of similar attractions.

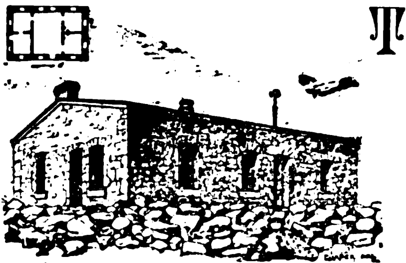
I have already spoken of the difference in effect between Ratisbon and such a town as Würzburg, whose most visible stamp was given by the eighteenth century, but it is just as different in effect from Nuremberg. This latter is above all things bright, cheerful, picturesque, and fascinating even to those who care nothing for architecture in itself — only for its pictorial attractions; but Ratisbon cannot be called picturesque any more than it can be called gay and cheerful. It is stern, dark, forbidding, and its most peculiar structures have all the severity of earlier times. Of course picturesque structures will be found among the pointed buildings, and picturesque bits of various kinds in many places; but the general aspect of the town would not appeal to a painter's eye nor to the eye of a tourist uninterested in architectural relics, or in historical associations. To one who is so interested, however, I cannot praise its charm too highly. One would never think of comparing it with Rome—no two cities in the world could be more unlike; yet it gives one much the same feeling he has on Roman soil—the feeling that countless generations of active and powerful men have trod its streets, that each has used over and over again the materials supplied by earlier days, and each has left its more or less mutilated traces to be clearly read by the practised eye. As an abode of man, dating to really prehistoric times, rich with a varied and imposing history, and subsisting alive to the present moment, it is almost beyond comparison for interest and impressiveness. When a night's journey took us back to Dresden, when we awoke to find ourselves in a town which dates, practically, only two or three centuries back, we felt as though we had been reborn into a quite different world—the world of to-day as opposed to the world of the early Christian centuries.

I must not close this all too rambling and fragmentary tale of what a few brief weeks revealed in a few Bavarian towns without saying once again that no visitor should attempt to see such a town without providing himself with one of the excellent little local hand-books that are to be found in every place. Much assistance will also be given by a book on the "History of Art in Bavaria," written some years ago by Dr. Sighart. The author's critical taste is not always above reproach, perhaps;—he is too often carried away by indiscriminate enthusiasm. Especially, when he speaks of Munich, which was built by the royal house, to one of whose members his work is dedicated, he falls into sad endeavors to approve of its architectural monstrosities; but what we want and get from him is facts, not opinions, and his work is invaluable to the student, having done for Bavaria what has not been done with equal completeness and similar brevity for any province of Germany—having given an historical account of the development of art within its borders, from the earliest days down to the present moment. His illustrations are ample and well chosen, and no branch of art is too modest to come within his plan. Not only architecture, but sculpture, painting, MSS., glass, and the work of the minor craftsmen, are treated with commendable skill and fulness.

M. G. van Rensselaer.

THE ILLUSTRATIONS.

UNITED STATES SIGNAL STATION, PIKE'S PEAK, COLO.



U S Signal Station. Pike's Peak Colorado 14156 feet above the sea.

THIS is the highest building in the world that is inhabited during the entire year, and the highest signal station in any country, being 14,156 feet above sea level, and is regarded as of especial value for the study of electrical phenomena. The walls are two feet thick, and ten feet high, built of rubble from the stone found on the peak, a sort of grayish-brown granite and an extremely hard stone. The mortar used was one part of Louisville cement to three parts of sand; the sand was obtained by screening coarse gravel formed by the disintegration of granite boulders and was "packed" on burros from near timber line, which is about 11,500 feet above the sea.

The water used in mixing the mortar was packed about five hundred feet up the side of the mountain. All the other materials were packed on burros from Manitou, nine miles by the trail, with an ascent of nearly 8,000 feet. No lumber over eight feet long could be packed up. The walls and ceiling are not plastered but sheathed with pine ceiling. The windows have all double sash. The rooms are ventilated by registers set into the ceilings, and an Emerson ventilator on the roof; the latter is of tin with standing seam, the tin being carried down on the face of the walls under the fascia of the cornice so as to prevent the wind getting under it.

A 2″ x 4″ plate is notched into the top of rafters and anchored to the stone walls by bolts three feet long. The building was put up in a little over two months at a cost of about $5,000, and on the night of October 11, when nearly finished withstood a gale of eighty-six miles per hour, the heaviest wind recorded during the ten years that the signal service has had an observatory on Pike's Peak.

The building was designed by Mr. P. P. Furber, who has been representing Messrs. Peabody & Stearns in Colorado Springs.

WROUGHT-IRON GATES FOR THE MILITARY NATIONAL CEMETERY, ARLINGTON, VA. MESSRS. SMITHMEYER & PELZ, ARCHITECTS, WASHINGTON, D. C.

These two wrought-iron gates were made for the eastern and western entrances to the Military National Cemetery, at Arlington, Va., near Washington, D. C., where they now are. General M. C. Meigs, then Quartermaster General U. S. A. (1880), while in Europe saw and admired some magnificent bronze, and equally beautiful (and old) wrought-iron gates; on his return home he conceived the idea of giving the American wrought-iron workers a trial of skill, and having charge of the Military Cemeteries, he had these two gates designed and made for the cemetery at Arlington. Quite a number of parties put in their bids for them; they varied from $5,000 to $11,000; Messrs. Schneider & Sons, of Washington, were the lowest bidders, and they made them satisfactory to all parties.

ROOD-SCREEN AND CHOIR-SEATS FOR ST. STEPHEN'S CHURCH, PROVIDENCE, R. I. MR. HENRY VAUGHAN, ARCHITECT, BOSTON, MASS.

This screen is intended as a memorial of the late vicar of the church, and is to cost, with the reredos, which is not shown in the drawing, $4,000. The cabinet-work was done by Irving & Casson, and the carving by Evans & Tombs, all of Boston.

HOUSE ON WAYNE ST., DORCHESTER, MASS. MR. GEORGE MOFFETTE, ARCHITECT, BOSTON, MASS.

"BROOKSIDE," HOUSE OF WALTER JONES, ESQ., SCHENECTADY, N. Y. MR. FRANKLIN H. JANES, ARCHITECT, ALBANY, N. Y.

THE SEWERAGE OF PARIS.[1] — II.

FROM the foregoing summary it seems that a clear idea may be obtained of the applicability of Waring's system for the removal of household water and fæcal matters. Paris may be divided into a certain number of local districts. These local districts would be drained of their domestic wastes by the pipe-sewers of Waring's system, and the product of each district could be delivered either by natural fall or by pumping — if that should be necessary for some districts — into one of the collecting sewers conveniently selected and having a sufficient minimum flow. If we suppose the daily discharge of the collectors, to-day 300,000 cubic metres, should be increased within a short time to 400,000 cubic metres, and that also the daily discharge of all the Waring drains would be for all Paris about 45,000 cubic metres, we see that these special affluents would carry, on the average, to the points of discharge only about eight or ten per cent of the present flow of the collectors which would receive them. Should an objection be raised thereupon, especially in view of the fact that the affluents contained only matters which have not yet entered into fermentation, it is to be met by the fact that the total removal of household and fæcal matters by means of sewers must, for other motives, be absolutely prescribed.

How shall the Waring sewers be established in each district? These are details which we need not now consider. Where there are now no large sewers they cannot be otherwise placed than in the ground under the public streets. Where large sewers already exist, must they necessarily be placed within these? Some persons answer in the affirmative. But if private drains are not now connected, we doubt that they are right, and hold the matter in abeyance. It is, after all, a question of detail which in no respect affects the system, and which will receive a practical solution.

It is more interesting to consider the change that the proposed disposition will produce in the sanitary condition of the existing sewers.

Completely relieved of household waters and all fæcal matters — for the public urinals and châlets can be drained by the Waring system — the primary sewers will henceforth receive, aside from rainwater, only the water used for washing the public streets. Can they also be relieved of the waters of manufacturing establishments, including in the series the discharge of abbatoirs, markets, and public baths and laundries?

It seems to me that this cannot be doubted. The flow of water to be considered is nearly constant, and indeed they can be received into these pipes with advantage, the diameters being increased as may be necessary, because they would increase the cleansing effect of the current.

In any case the percentage of nitrogenous matters in the whole system of primary and secondary sewers, and even in each collector above the junction with a Waring affluent, would be very greatly reduced. Furthermore, all the branches of the system corresponding almost to the total surface of the city would be entirely relieved of suspected germs.

We should have a complete change of condition, not only in this *ensemble* of sewers, from the point of view of cleanliness, but also for those regions of the city which lie above them in all that relates to healthfulness. As to the cleansing of the sewers, there would remain but one serious question: that of sand. But, independently of many other considerations, it is clear that in eliminating the solid matters conveyed by household waters and excremental liquids, which now soil these solid deposits, compacting them and impregnating them with foul odors — a difficulty which will be greatly increased after the delivery of all fæcal matters into the sewers — we shall render the removal of the sand less disagreeable and therefore less costly.

The inlets of the primary and secondary sewers, which more or less always, but especially in summer, send out such offensive odors when the inverts of the sewers become dry, will be relieved of this objection, which so seriously affects the public health; and it will be useless to think of borrowing the trapped inlet-basins of Brussels, which even there are not irreproachable, and which would be inapplicable in Paris by reason of the greater abundance of street detritus.

The atmosphere in which the sewer gangs work, and to which they are acclimated, but which is nevertheless not without effect on their health, will become nearly as pure as the free air. The question of cleansing, already solved for the collectors, but so difficult in the case of the minor sewers, will be entirely transformed, and the work will become much more economical.

Let us add — and this is not one of the least of the advantages of Waring's system — that the drainage of Paris, so far as it is practically necessary, can be applied much more rapidly and with a considerable reduction of cost. There is now in fact a great extent of streets without sewers. Nearly all that are yet to be constructed are primary sewers, draining only the streets under which they lie. With the present idea of delivering all foul matters to the sewer (*tout à l'égout*) these sewers are indispensable. The use of Waring's system would allow them nearly all to be suppressed or their construction to be postponed to a distant day. Not that such sewers are absolutely without their use, especially in connection with the distribution of water; but the final ramification of the water-pipes could perfectly well be placed in the ground. As to the water used in washing the streets, there are but few points where they now have to run far in open gutters. We could therefore avoid constructing immediately almost the whole of these sewers. This would result in a considerable economy, which may be estimated, supposing the Waring sewers to cost from fifteen to twenty francs per metre, at not less than eighty to eighty-five francs per metre; and besides that, what an economy for householders in all that relates to branch connections!

In a recent paper, the Direction of the Works of Paris, estimating the length of sewers of only local interest still to be constructed at 343,429 metres, and the outlay required therefor at 35,000,000 francs, we estimate that at least 250,000 metres, and perhaps 300,000 metres of this length could be suppressed, at an economy of 80 francs per metre. This would be 20,000,000 or 24,000,000 francs, of which the necessity would be totally suppressed, or at least postponed for a long time. These figures are not to be disregarded. They add an important consideration to the adoption of the Waring drainage within the limits above indicated. And to whoever would charge this combination with complication, it may be replied that the specialization of functions that it secures is rather a progress. It is the specialization of organs and the localization of functions that characterizes the most perfected organisms. The objection seems to us without value.

There remains, however, one question in connection with this system: that of determining whether or not the augmentation of the percentage of nitrogenous matter in the waters of the sewer, as a result of the total removal of domestic wastes by this means, will not be in itself objectionable, either during the subterranean flow of the sewage or in connection with its purification.

As to purification we have nothing to say. As to the current in the sewers, by causing this increase in the percentage of nitrogenous matter in the collecting sewers which have a large flow — where organic matters rapidly carried forward will have arrived without fermentation — the objections will be much less than if the increase was produced within sewers of feeble current, where these matters have often ample time to enter into putrefaction.

Will these objections nevertheless exist? This is a point which we cannot decide; but we believe that they will at least be unimportant.

It may be further remarked that the circumstance described is not the only one that may ultimately be urged for the extension of Waring's system, which may be made to withhold from the collecting sewers themselves all domestic wastes.

If the progress of industrial chemistry succeeds in finding means by which artificial manure can be made from domestic wastes without the emanation of dangerous gases, and without the production of a foul liquid residuum, and under conditions which can cause no prejudice to the public health, it is quite possible that we shall be led to establish a system of complete and absolute separation between domestic wastes and the ordinary sewer water. The latter may continue to flow to the purification fields; but the former will be sent directly to factories, where they will receive their chemical treatment.

It is not at all necessary to insist on this rational point of view, which, however, it was necessary to indicate as a part of the complete question. The industrial progress referred to may never be attained, or we may have to wait long for it. Should it be attained, and should the absolute separation referred to become necessary, we should have to regret, because of the provisional discharge of the Waring drains into the collectors, only an insignificant wasted expenditure. We might almost everywhere in effect place within the present collecting sewers the collecting pipes of Waring's system, the dimensions of which, even for all Paris, would not exceed narrow limits.

We may, then, in all that relates to the expulsion from Paris of all its foul wastes, go on without fear in the way above proposed.

It seems essential, so far as relates to the discharge of household wastes and fæcal matters, to substitute the sewers of Waring's system for our primary sewers, which carry an insufficient flow of water.

It is the object of the present paper to call attention to this point, believing that the considerations that are here developed constitute a reason for hastening the practical trial of Waring's system, as asked for by the Second Sub-Commission. This will be for the moment our only conclusion.

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[1] Continued from page 67, No. 398.

Water-proof and other Special Paints and Varnishes. — The *Neueste Erfindungen* says that the water-proof preparation of G. Gehring, in Landshut, is prepared by melting together 60 parts of paraffine, 15 parts of wax, and 30 parts of palmitate of alumina made by precipitating a solution of palm oil soap with alum. The stone, metal, or wood that is to be water-proofed is warmed to 140° or 200° Fah., and then coated with the melted mixture. For fabrics he employs a mixture of 60 parts of paraffine, 20 parts of palmitate of aluminum, and 10 to 15 parts of yellow wax dissolved in linseed varnish, to which is added from 6 to 15 parts of oil of turpentine.

A. Riegelmann, in Hanau, has patented a rust protector which consists of ordinary oil paint mixed with ten per cent of burned magnesia, baryta or strontia, besides mineral oil. This neutralizes the free acid of the paint, and the alkaline reaction protects the iron from rust.

To prevent iron from rusting in the ground it is painted over with a mixture of 100 parts of resin, 25 parts of gutta-percha, 50 parts of paraffine, and 20 parts of magnesia, besides mineral oil. A temporary paint for the movable parts of machinery contains twenty or thirty per cent of magnesia or burnt dolomite, with some vaseline added to prevent drying.

MODERN ARCHITECTURAL PRACTICE.[1]—II.

THERE has been something, so far, remarkably bold and unprepossessing in naked constructional ironwork, though we do not know what magic change the artist may effect in its aspect hereafter. One objection to its use hitherto as an exposed architectural feature in the exterior of our buildings has been the necessity for frequently painting its exposed surfaces, which prevents its acquiring those accidental touches from the hand of time which add so great a charm to the architecture of the past. Our late Professor of Chemistry's process of superoxidation would appear to remove this objection, and by stopping rust allow of the natural surface of the metal being in certain cases exposed.

I have thought I might be allowed, even in the lecture-room of the Royal Academy, to dilate a little on iron construction, seeing that it must, in my opinion, be increasingly used as the framework on which the art expression of the future will find a place. I view it, therefore, as of the greatest importance that we should apply it in the wisest and rightest way.[2]

This use of iron and other new materials which seem likely to be more and more forced upon us, will oblige, if rightly applied, the development of new forms and modes of construction. If we bring ourselves to take kindly to these innovations, strive to get the most we can out of them constructively, clothe them at the same time, I do not say with all the ornamentation, but with all the grace and beauty they and we are capable of expressing, it will cease to be a reproach to us that our day is without a distinctive architecture of its own, for it will have one, and it may be a good one, and our architects will have no cause any longer to fear the civil engineer invading their territory, for they will hold their own against all comers.

But this cannot be, so long as we are wishful or content to let iron look like wood or stone, or strive to reproduce to-day in new materials the forms of a bygone style. To-day has its new requirements, views, duties, and aspirations. Our new materials, it may be, require an entirely different treatment for their successful application to those employed in the bygone style.

But I would not be supposed to be too revolutionary. Let us have no change for the sake of change. There are many mediæval features which retain a utility for which they are not always accredited. I have heard, for instance, many people condemn the modern use of gargoyles. Gargoyles were undoubtedly used originally to eject the rainfall from the gutters as far as possible from the building. We now, out of consideration for our hats and bonnets, convey the water down the walls by means of spouts, which is right enough so long as all goes well with our spout; but suppose (as will frequently happen so long as birds die and leaves fall), it becomes choked, and refuses to perform its functions; we are just then as though we were without our downspout altogether, and should be thankful to those whose care has provided the friendly gargoyle, borrowed though it is from the Middle Ages. The mouth of the gargoyle then comes into play with watery discharge, to warn us of the functional derangement of our spout, and so prevent the permanent soaking of our walls.

Allow me, then, whilst exhorting you to hold fast whatever is to be found in the great storehouse of the past which is applicable to the wants of the present, to be on the alert to take advantage of whatever modern science or discovery may offer you, giving it at the same time the greatest beauty of expression it is capable of receiving.

While it is of the first importance that your building itself should be perfect in its planning, construction, and grace, there is another matter (on which I may be allowed to say a few words) which comes next to it in importance in an architect's practice. I mean the way in which he produces his design on paper. Formerly the architect's working drawings might have been of a slight character and imperfect as to detail—most probably were so. Now, however, there is no excuse for our drawings not accurately portraying the building as we have designed it, and as it would look if executed, omitting those accidental effects of light and time, for which the architect can hardly take credit, yet which lend the greatest charm to his work.

One thing is certain. No one can pretend to draw architecture rightly who is not first conversant with the structure of what he is drawing; and who, secondly, does not know what to attempt to represent with his pencil, and what to leave for the imagination to fill in; and who, thirdly, knowing all this, has not the technical skill to represent it with fair, clear, unfaltering strokes. In sketching from existing buildings, you should accustom yourselves to do without any extraneous aid, such as straight-edge or camera. Trust to nothing but eye and hand, unless you are making measured drawings. This habit of sketching is invaluable to the architect, and will lead to his being able to throw portions of his own buildings into perspective with facility and without elaborate preparation. This cannot be done too often or from too many points of view before the work is begun; but never allow yourselves, however, for the sake of a more effective drawing, to represent your building otherwise than it would appear in reality when brought to the perspective test. Wherever you find your design deficient, at once set to work to amend it; and be scrupulous, in any perspective view you may exhibit, to alter no proportion of your building, to bring no feature into more prominence than it would assume in your finished building. By such tricks, we might deceive ourselves, and others also, for a time; but they would be unworthy of us as artists and honorable men.

The example of two or three illustrious masters of the art using the pen, and the pen only, in illustration of works of architecture, has made this mode of delineation very fashionable. When used in the way these artist-architects use it, the pen produces fascinating results. There is a wonderful sharpness and brilliancy in the detail, and there is something left to the imagination which is of course one secret of success in architectural draughtsmanship as in other forms of art.

I am, I confess, one of those old-fashioned people who have a lingering affection for water-color as the best mode of representing architecture. Pen strokes, after all, do not give so reposeful a breadth of shadow as a wash of gray, and are apt, unless very skilfully handled, to get confused with the lines which are intended to represent important details — as string-courses and other mouldings. Moreover, architecture has to do with color as well as form, and the exclusive use of the pen ignores this important part of the architect's care. It is apt, also, I think, to make us somewhat thoughtless about color. When building materials consisted, in London, at any rate, exclusively of Portland stone, of gray stock bricks, or of deep red ones—the two latter destined to become a dark gray, and the former a harlequin arrangement in black and white—color in our exteriors, at any rate, was not of much consideration. The introduction, however, of terra-cotta and washable brick, ceramic ware in other forms, and variously-colored granites, which steam is bringing into our midst from most unexpected and distant quarters, makes the polychromy of our buildings a very important consideration, and I question the propriety of the disuse of color in those drawings whose function it is to convey the most accurate notion possible of the effect of our buildings before they are erected.

It may, therefore, be questioned whether the present practice of forbidding the coloring of perspective drawings in the case of competitions when materials of different color are used, is a wise or right one; whether it conduces to the clearest appreciation of what the design would be when executed, which is surely what the promoters of competitions ought to strive to arrive at. In all such drawings the human figure should be represented, and that not below five feet six inches in height, to give the real scale of the building in the clearest and most unmistakable way. I have the more pleasure in descanting on this theme, because in this matter of perspective drawing I believe our practice to be sounder than that of our neighbors in France and Germany, whose most elaborate drawings are, so far as I have been able to judge, all geometric ones.

This habit of drawing in perspective ought to aid us also in arriving at the most beautiful proportions, as many objects look satisfactory in front view, which, when seen diagonally, as they usually are seen, more or less, are anything but agreeable. Countless instances will occur to you where square forms are associated with circular or spherical ones which may, from their contrast, be productive of an agreeable variety when seen diagonally, or which, on the other hand, may from such a point of view be so entirely out of harmony with their surroundings as to require modification—the square, it may be, giving way to the hexagon or octagon, or the circular form itself to some polygonal figure. Of course, I suppose that no one in his senses would think of building a tower square on plan, with an octagonal lantern and spire, without first trying its effect in perspective. But I think it must be apparent to those who use their eyes that many structures, otherwise of great merit, would have been much greater successes had their designers considered their general aspect in perspective with the care which they have bestowed on the details.

Sir Gilbert Scott used to say, "Do not do *what* the early builders did, but *as* they did." The architect should not be content with amassing piles of drawings and sketches; he must reason as he draws. If he sees an edifice whose aspect strikes him, let him carefully sketch and measure it — nothing can be more desirable; but he must also get a clear idea of the *causes of its attractiveness*. If we discover the means adopted by a master of our art to produce a success in a given position, and under certain conditions, we shall do more for our successful practice than by heaping up stores of "choice bits" to patch together hereafter without reason and a sense of fitness.

Very much has been written about the proportions of buildings. The most familiar instance of this is the formula given by the Renaissance architects for the production of the Classic orders, taken from Roman practice rather than Greek, in which they were more often varied. This particular instance has been worn rather threadbare, and as a result of the fixity of these rules, we find the

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[1] A lecture delivered at the Royal Academy, February 8, by Alfred Waterhouse, A. R. A. Continued from page 70, No. 398.

[2] Had I known, however, when I wrote these remarks, that iron would form the special subject of the next lecture in this place, I should have refrained from them entirely. I rejoice to think that so important a question as the use of iron in architecture is so soon to be brought before you in detail by one so well qualified to treat of it.

orders misapplied (though they may be correct so far as implicit adherence to rule goes) by persons who have had no real feeling for architectural proportion, till they have become more or less of a byword.

This study of proportion is a fascinating one, but it also is very dangerous, unless the student will take nothing for granted — will accept no formula without testing it to the utmost, without bringing all his artistic judgment to bear upon the question, whether the adherence to such a formula, whatever it may be, has been the cause of the beauty of proportion in the buildings it lays claim to. I confess that the little power of observation I have been able to bring to this subject has not always been encouraging for the formulæ.

Plutarch would have us believe that the right-angle triangle gives us a magic proportion, because the sum of the square of the two lesser sides forming the right angle equal the square of the third subtending it, as 3, 4, and 5.

The Egyptians appear to have based their architecture largely on the equilateral triangle. The Greeks also held by the equilateral triangle in their Doric porticos, the base of the triangle being equal to the distance between the centres of two columns, having one intermediate, or between the exterior of two such columns and its apex touching either the upper or the under side of the abacus of the intermediate, according as they wished their order to be elegant or robust.

It is also very singular that if we let fall a perpendicular from the apex of an equilateral triangle on to its base, and use this perpendicular for our height, and take the diagonal of the square of one of the sides of the same triangle for our width, we get exactly the two principal dimensions of the front of the Parthenon, taking its width at half-way up its angle columns, which also gives the angle of its architrave. Further, that where these diagonals cut the lower edge of the architrave, you get the position of the axes of the third and sixth columns; the intercolumniation of the six central columns being all equal, you can then mark off their axes and discover the true intercolumniation between angle columns and the second and seventh, which intercolumniation is considerably reduced to give strength to the corners of the building. The diagonal also cuts the axes of the second and seventh columns into two equal portions, either of which gives the modulus which fixes the relative proportions of this wonderful building, one module being the height of the pediment and cornice, half a module of the height of frieze and architrave combined.

I must confess to finding that the equilateral triangle seemed to have been allowed to dominate the proportions of many of the finest French churches. At Vezelay, for instance, you will find it permeating the principal features of the longitudinal section in a wonderful manner (see page 231, in Vol. I. of V. le-Duc's "Dictionary"). In Bourges also you will find that the proportion of the church is based on one grand equilateral triangle, the base being the floor-line from the inside of one outer side wall to the other, and the apex exactly touching the apex of the transverse rib of the nave vault. In other instances, however, the equilateral, if it exists at all, starts from outside the aisle walls with its apex under the transverse rib of the nave, showing that the designer cared for the figure merely as a basis of strength, and not for any artistic value it might have, as in such a case it is manifestly impossible for an observer to take in the three points of the triangle at one and the same time.

It is clear, both from its having been so often insisted on by those most competent to judge, and from one's own experience, that it is proportion which is finally the most satisfying element of good architecture. In youth it is the clever bit, the original turn, which has been given to ordinary details, the *jeu d'esprit* exhibited by the artist, which fascinate us; but as we grow older, subtlety of proportion enchains us more. This faculty of enjoyment in the shape of things depends, I am inclined to think, not so much on our having lost the vitality of youth, as on the education of the eye. I would not disparage the study of the fancied laws of proportion. They are interesting; but the practical architect must rely on something more stable. What should we say of the sculptor who relied on his power of producing a masterpiece simply by his knowledge of the length and other dimensions of every bone? He must have his sense of the beautiful to make his knowledge of anatomy useful to him as a sculptor. In architecture we have, as a rule, no absolutely fixed dimensions to guide us, except those somewhat elastic ones based on the requirements of the case; and the constant quantity the size of the human figure. So that even more than in the case of the sculptor it appears to me we are dependent on our sense of the beautiful, quickened by observation, to guide us on our way. In order to see how fallacious a guide the rules of proportion, which we fancy have guided our predecessors, may become in the hands of those who would press them overmuch into their service, it is only necessary to look at some of the examples of the designs based on these proportions. It is impossible to believe that their authors would not have done much better without such leading-strings. This is true even of features in the same vertical plane, as the doors, windows, strings, pilasters, and cornice of an otherwise unbroken façade; but how utterly fallacious do such rules of proportion become when the features to be bound by them do not come in the same vertical plane; when the apex of the equilateral triangle of which the ground-line of your buildings is the base, is the top of a clock-tower, let us say, at a considerable distance behind the front, or when the apex of your triangle is some point only seen in the interior of your cathedral, while the extremity of its base are points only to be seen on the outside. And yet those illustrations may be seen in the works of one of the most learned writers on architecture in modern times.

If in the former case, that of the campanile rising behind the front, the grouping of the composition was perfect when seen on paper in geometric elevation, it must of necessity be imperfect in the real edifice, when the lower part of the campanile comes to be hidden by the upper parts of the more adjacent façade.

Let it not be supposed that proportion is limited to the difference between the height and breadth of your window or door openings, or the number of diameters which go to determine the altitude of your columns, or the depth of the entablature above them. Beautiful proportion should pervade everything, from the shape of your blocks of stone in the otherwise unbroken surface of your walls, to the outline of your building itself. But again, the shape of each feature must be considered as parts of larger features, and these again of the whole mass. The diagonal of a square one side of which gives the width, is generally considered a satisfactory height for a pane of glass, but there are cases where a square or double square would be more appropriate and better satisfy our æsthetic sense. The proportion of everything is of course affected by its height from the eye and by its surroundings, as a window by the nature of the architrave or other decoration which encases it. The same façade, if broken vertically by pilasters, will give an entirely different effect of proportion to what it would if without the pilasters it were banded by numerous strongly defined string-courses.

The painter and sculptor allow themselves some freedom in the proportions of the human figure according to the impressions they wish to convey, and so may we, notwithstanding the rules of Scamozzi and Palladio, vary the proportions of our orders to a certain extent out of deference to their position, or the effect we wish our building to produce; and this we may be the more sure of because we find the Greeks were before us in this exercise of artistic liberty. The great advantage, however, in our being somewhat emancipated from the slavery of rule is that this exercise of liberty will cause us to *think*. Let nothing be done simply because it has always been done before, because in architecture, at any rate, the conditions of things are perpetually changing, so that a doorway which was simply perfect where you first saw it, in Verona for instance, is positively painful when you reproduce it line for line in the Strand.

You cannot study the work of your predecessors which pleases you too closely. Get to know why it pleases, what there is in it incidental to its surroundings, what of inherent beauty; sketch it and measure it, live with it, visit it in early morning, in the shades of evening: get to know it as you would the mind of your dearest friend; but do not pull it up by the roots to plant it elsewhere. That red marble griffin basking in Verona's sunshine would in all probability cut but a sorry figure if reproduced in Portland-stone, in the shade of some club-house in Pall-Mall.

As one example of what may be done by the training of the eye to give delicacy and refinement to form, I may mention *entasis*. Nobody would neglect this in a classical column. The Five-Order-mongers have taught us this at any rate, and few would forget it in their spires; but a slight inclination inwards is not out of place in the otherwise vertical lines of towers when used in moderation. The vertical line of buttresses between the strong slopes of the weatherings are, I fancy, the better for a very slight batter, and all features such as pinnacle and spire lights around a central spire must sympathize with the direction of the spire, or appear to be most unpleasantly antagonistic to it, in fact appear to be falling outwards. Nothing I know of gives more refinement and grace to a building than attention to these points.

Another is the proportion of the spaces into which your building is divided by strings and other horizontal features. However monotonous your building may have to be in the setting out of its voids, the artist-architect can always contrive some variety in his spaces measured vertically, and some happy results are in that way attainable, even when your superimposed stories may be of the same height.

It is to you that we must look for progress in the future. Believe me, there is little to be done without enthusiasm and when are we to experience enthusiasm if not in our youth? It is true that there are many enthusiastic men of mature age; but if we take the trouble to look back at these men, we shall find that they have not gradually become warm in their love for their art and for all that enchants them in the art of the past, but were so from their youth onwards. Take Scott and Street for examples.

With your enthusiasm cultivate also the critical faculty. Take nothing for granted. Whether your study be a building of the past of universally acknowledged excellence, or one of to-day, neither accept the one nor despise the other, without the exercise of your reasoning faculty. Analyze, compare, and discuss the work of your masters and contemporaries. Does such a building lack rhythm and repose; what would have saved it? Does it appear to want dignity; what would have imparted that to it? Are there features about it which appear to be useless? — are you sure that they could have been dispensed with? Is there no hidden requirement which these apparently useless features fulfil? If there is none how would the work have looked without the features in question? Take your pencil and try. Is that column too heavy for its superincumbent load? Draw one better adapted for that load. Does a window appear not to fit happily the space left for it beneath the vaulting or curved roof

principal? Design a better, taking care at the same time, that it becomes the gable externally as well as your original does. Does a finial appear too large for the gable it surmounts? Draw the gable with one which, in your opinion, would become it better — be more in sympathy with its lines, giving it greater apparent altitude and refinement. Thus if, in the work of others, any detail jars on your susceptibility, you will learn, it may be, how to avoid such incongruities in your own work.

On the other hand, learn to discover the secret of what most pleases you in other men's work. Have a mind always open to receive agreeable impressions. One of the most potent spells which architecture exercises on the imagination arises from a sense of mystery which sometimes, by good fortune, pervades it. Where you find this, discover by what means this precious quality has been arrived at. It is not, I know, always possible to secure it; but, happy is the artist, the exigencies of whose plan will allow of it. Fortunate are you if, on entering your room, the visitor does not at once discover every nook and corner of it. Fortunate are you if you need not flood it with an equal intensity of light. It is the happy apportioning of light and shade which constitutes the great secret of architectural effect. It should be, however, our constant effort to secure this chiaroscuro, without sacrificing one iota of real convenience thereto. But, in fact, the skilful manipulator of light will often conduce to his most brilliant effects of light by leading the spectator to it through a somewhat gloomy portal or corridor. Much work, and good work, too, is seen to the greatest advantage in a subdued light. It should be our care, also, that our artificial lighting should contribute to this effect of mystery — to this happy alternation of light and shade. I am aware that in this matter we have not an unthinking public with us. It is difficult — impossible, to persuade most people that the charm they experience in some architectural effects is entirely dependent on the partial gloom which they appear to hold in such unconquerable abhorrence, and which, if any sacrifice of convenience were involved, they would justly so hold.

Instances will occur to all of you of impressive interiors. If you seek to analyze the source of their impressiveness you will find, if I mistake not, that it is a sense of there being much beyond what the vision actually takes in at one time, which fascinates you. Two buildings specially impress me in this way. One is St. Mark's, Venice, and the other much nearer home, is our own Abbey-church of Westminster. The view from the west end of the eastern window of the choir, with its incomparable glass, at a giddy height, in an atmosphere always more or less blue when seen against the more adjacent choir screen, is heavenly in its mystery. And though those white marble commonplaces which line the walls and ruthlessly conceal, or, still worse, cut away, thirteenth-century loveliness so alien to their own uncouthness, do their best to destroy the awe which overcomes one on entering its portals, yet when past the white horrors in the transepts, and once in the ambulatories, what an endless succession of mysterious pictures meet one at every step till they culminate in that, to me, most impressive of all effects of light and shade, the view of the ascent into the Chapel of Henry VII, under the chantry of Henry V, which overarches the way. Get rid of the shade thrown by the chantry in the middle distance of your picture, and what would become of that deservedly favorite subject?

Then there is another source of architectural effect exemplified in that ambulatory — the added interest to be obtained by occasionally building off the right angle. The square east ends of our churches are dear to the English ecclesiologist; but I confess myself to be altogether carried captive by the perpetually unfolding beauties of a French *chevet*, where each step is a fresh surprise, and where, though order and symmetry are distinctly discernible, no wall seems built parallel to any other wall. In Westminster, an English church on a French ground-plan, this changefulness is accentuated by the glorious mediæval monuments which are crowded together in every available space in this corner of the church: but the constant change of direction in the plan ought to convince those who are so hard to convince that by merely occasionally departing from the right angle in our plan, a charm and individuality may be given even to simpler buildings of an otherwise commonplace character. Of course, I need hardly tell you that this, when attempted, must be done with extreme caution, and with an evident regard to the convenience and requirements of the case. The masters of our art in the Middle Ages never attempted eccentricity, nor must we. Our picturesque effects must never be secured at the price of utility, nor by the sacrifice of needful light.

In conclusion the remarks you have been so indulgently listening to may be summed up thus: that as nineteenth-century architects we must look to it that our reason, our intelligence, our cultivated good taste, rather than the rules of archæological tradition, should be brought to bear upon the new materials and new refinements of our age; that as artists in the present day we shall probably be wiser to give grace to our buildings by refinement of proportion, rather than by redundancy of ornamentation; that this refined sense of proportion must be the outgrowth of careful observation; that we should be careful to make repeated studies in perspective of our designs to secure this coveted grace and refinement of outline and proportion from every point; and that, above all, we should take nothing for granted, but carefully analyze the work of our predecessors and contemporaries, in order that we may unsparingly apply the same process to our own work — proving all things and holding fast only to that which is good.

AN ENGLISH DOLLAR.

SAVANNAH, GA., August 4, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — A friend handed me an English coin, of which the enclosed sketches are free-hand copies, and asked for any information concerning them that I could give. Being unable to give him any information in the premises, I made a rough copy to send to you, thinking perhaps that you or some of your numerous correspondents could give the history of the coin. The owner has shown it to some English and Scotch gentlemen here, some of whom stoutly denied that there ever was an English dollar, until convinced to the contrary by an inspection of the silver piece. Very truly yours,

JOHN J. NEVITT.

[THE sketch shows a coin with head of George III on one side, and inscription: "GEORGIUS III, DEI GRATIA REX"; and on the reverse, an oval band with a crown above it, encircling a figure of Britannia seated, with cornucopia and shield. On the upper part of the band is inscribed: "FIVE SHILLINGS," and at the bottom, in the same lettering, "DOLLAR." Around the whole is the inscription: "BANK OF ENGLAND, 1804." Some of our readers, more familiar with dollars than ourselves, may perhaps recognize this coin. — EDS. AMERICAN ARCHITECT.]

THE ANNUAL CONVENTION A. I. A.

PITTSBURGH, PA., August 7, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — Can you please inform me whether the sessions of the American Institute of Architects, which will be held at Providence and Newport this month, are open to members of the profession outside of the Institute? and also the date of meetings. An answer will very much oblige Yours respectfully, GEO. S. ORTH.

[IT is, we believe, customary to invite all the local members of the profession in the place where the Convention is held to attend the sessions of the Convention, and architects from other places, presenting to the committee of arrangements letters of introduction from any member of the Institute, would undoubtedly be cordially received. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

IS ASPHALT COMBUSTIBLE? — A summons taken out by Mr. Watson, district surveyor of St. George's, against Mr. Way, builder, for covering a concrete flat with asphalt at the house No 4 Half-Moon Street, Piccadilly, was brought before Mr. de Rutzen at the Marlborough Police Court yesterday. Mr. Watson said he found a flat at the house in question covered with concrete and asphalt. He considered asphalt an inflammable material, because it melted and partly burned when a piece of it was held in a gas jet, and that as it dropped it would set light to anything combustible near it. Mr. Cubitt Nichols, architect, said he was engaged on the buildings in Half-Moon Street. He considered asphalt, as used in the pavements and for flats, the best incombustible material, and safer than a lead covering. Professor Attfield, F. R. S., stated that he had analyzed and tested asphalt. It contained a small portion of bitumen, which, if extracted, would burn. About ninety per cent of all asphalt was earthy matter, which would put out flame far better than water. In cross-examination, the witness said that in any case asphalt would not convey fire. After further evidence Mr. de Rutzen stated that he was clearly of opinion that asphalt was incombustible within the meaning of the Act, and dismissed the summons. — *Pall Mall Gazette, July* 20.

CINCINNATI'S CHIEF ENGINEER'S REPORT. — The report for the year 1882, of Mr. H. G. Hanley, Chief Engineer of the city (which has just been issued), contains much that is of public importance, and from it we make a few extracts. The total expense of the engineer's office was $29,941.10. Total amount for bridges, $17,387.78. The city contains 237.89 miles of improved streets and alleys, and the total amount spent in construction and repair was $113,796.78. The total number of miles of unimproved streets and alleys, 203. There are six parks in the city containing 539.06 acres, the care of which cost $13,202.68. The area of the city is 24 square miles. The city contains 221.42 miles of gas-mains, of which 29,157 lineal feet were laid during 1882. The total cost to the city for gas during the year was $176,728.54. All gas-mains are laid by a corporation, from whom the city buys its gas. Number of gas-lamps burning December 31, 1881, 6,390. Average cost per lamp for 1882, $27.20. Average price of gas per thousand feet, $1.440½. Number of new lamps erected during the year, 106. Of sewers there are of all kinds 54.45 miles, of which 3.76 miles were built during the year. It appears that only one-sixteenth of the city, or about one and one-half square miles of territory is sewered; about 70,000 of our population are afforded sewer privileges, while the remaining 200,000 have to trust to cesspools and night-carts to carry off (as is estimated) 3,200,000 cubic feet of human excreta, not to mention kitchen and bath-room wastes. There has been lately a public awakening on the subject of sewerage, and the aid of the State Legislature is expected to assess a tax of one mill on the city tax-duplicate for five years, which will afford a revenue of $150,000 per year for five years, to be expended for new sewers. The city has to pay for sewerage all excess over $2.00 per foot, as up to that amount is assessed upon the abutting property. The total cost of new sewerage including the city's proportion was $22,807. It is expected to spend about $600,000 during the year for sewers. This amount will include the city's proportion as well as assessments. Of the water-works department (owned by the city) A. G. Moore, Esq., Superintendent, the following will be of interest: Average daily consumption, 19,524,848 gallons; population as per U. S. census, 280,000; gallons of water *per capita*, 69; miles of iron pipe in use, 201,62; number of service branches, 24,858; total area of supply-mains, square inches, 2,552,54; total area of service-mains, square inches, 12,349; number of meters, 792; number of hydraulic elevators, 385; capacity of reservoirs, gallons, 106,500,000, maximum pumpage, gallons, 48,000,000; net annual water-rent receipts, $507,501; net annual expenses, 212,682.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

282,517. Door-Lock. — J. Jonas Helsing, San Francisco, Cal.

282,541. Wall-Paper. — Henry Lobdell, Troy, N. Y.

282,560. Carpenter's Bevel. — Charles E. Overend, Portland, Oreg.

282,562. Lightning-Rod. — Theodorus H. Patee, Greencastle, Ind.

282,567. Heating-Drum. — Dwight S. Richardson, Brooklyn, N. Y.

282,574. Hinge. — Alfred L. Scranton, Western Springs, Ill.

282,576. Hinge. — Amos Shepard, Plantsville, Conn.

282,583. Bevelling-Instrument. — Laroy S. Starrett, Athol, Mass.

282,603. Nail. — Wm. Z. Bean, Boston, Mass.

282,607. Hasp-Lock. — John C. Boggs, Auburn, Cal.

282,636. Rat-proof Building. — Joshua Hicks, Sandford, Ind.

282,641. Skylight. — Peter H. Jackson, San Francisco, Cal.

282,663. Shutter. — Irving Paine, Hornellsville, N. Y.

282,697. Combined Chair, Knee and Truss Bracket. — Jno. H. Bohn, Weehawken, and Alfred DeBevoise, West Hoboken, N. J.

282,703. Fire-Escape. — Michael Collins, Pittsfield, Mass.

282,712. Tool-Handle. — John S. Fray, Bridgeport, Conn.

282,716. Adjustable Window-Screen. — George W. and Wm. H. Gordon, Detroit, Mich.

282,726. Chimney-Flue Stopper. — Jonathan R. Higgins, Lima, O.

282,740. Fireplace. — David S. Loe, Poorman, O.

282,763. Elevator. — Edwin L. Parker and Samuel Peterson, Queensville, Ind.

282,792. Bench-Dog. — Wm. H. Stannard, Lyme, Conn.

282,800. Ventilator. — Daniel B. Taylor, St. Louis, Mo.

282,807. Preserving and Protecting Piles. — David H. Valentine, Brooklyn, N. Y.

282,813. Fireplace Grate. — Stewart Watt, Barnesville, O.

282,817. Safety-Stop for Elevators. — William Whitely, Housatonic, Mass.

282,822. Smoke and Flame Outlet for Buildings. — Chas. A. Willard, West De Pere, Wis.

282,831. Developing or Tracing Machine. — Frank Aborn, Cleveland, O.

282,858. Spring-Hinge. — L. M. Devore, Freeport, Ill.

282,876. Cistern-Attachment for Water-Closets. — Jas. Foley, Brooklyn, N. Y.

282,892. Fire-Escape. — Henry Hitchcock, Genesee, Mich.

282,905. Elevator-Hatchway Guard. — Emerick Kiss, New York, N. Y.

282,928. Sash-Holder. — Frank L. Rosentreter, Cleveland, O.

SUMMARY OF THE WEEK.

Baltimore.

Addition. — Mr. George Archer, architect, has prepared drawings for the Brush Electric Company, for a two-st'y brick addition (front), 36′ x 60′, to their property, No. 40 East Monument St., to cost about $5,000; John Waters, builder.

Building Permits. — Since our last report twenty-five permits have been granted, the more important of which are the following: —

Edward Valk, three-st'y brick building, s w cor. Pratt and Regester Sts.

John Kern, three-st'y brick building, n s Lafayette Ave., between Arlington and Carrollton Aves.

Lewis H. Robinson, 9 three-st'y brick buildings, e s Park Pl., cor. North Ave.

E. H. Webster, 5 three-st'y brick buildings, s e cor. Washington and Madison Sts., fronting on e s Washington St.

Henry Reier, 3 three-st'y brick buildings, w s Mount St., n of Lexington St.

Edmondson Estate, to rebuild Nos. 221 and 223 Baltimore St., s s, e of Charles St.

John Kuper, 11 two-st'y brick buildings, e s Calhoun St., between Pratt and McHenry Sts.; and 14 two-st'y brick buildings on n and s s Kuper St., between Calhoun St. and Woodyear Alley.

Peter Plett, two-st'y brick stable in rear n e cor. Lanvale and Mount Sts.

Alfred Sweeney, 2 three-st'y brick buildings, s w cor. Ridgely and Fremont Sts.

Alex. Rieman, three-st'y brick building, n s Lexington St., between Eutaw and Howard Sts.

Mary Vane, three-st'y brick building, w s Fremont St., n of Presstman St.

Boston.

Building Permits. — *Brick.* — *Winthrop St., Nos.* 29 *and* 31, Ward 5, for F. J. & Isaac Klous, 2 dwells., 22′ x 30′, three-st'y flat; ell, 19′ 9″ x 31′ 7″; Dennis McGillicuddy, builder.

Newbury St., cor. Exeter St., Ward 11, for Proprietors Hollis-street Meeting-House, church, 84′ x 100′, one-st'y pitch; Woodbury & Leighton, builders.

Federal St., No. 394, for Boston Fire Brick Company, manufacturing-building, 59′ and 70′ x 108′, four-st'y flat; Wm. G. Preston, architect; Woodbury & Leighton, builders.

Wood. — *Wheatland Ave.*, near Washington St., Ward 24, for John Galvin, 4 greenhouses, 18′ x 100′, one-st'y pitch; Joseph P. Shaw, builder.

Mt. Pleasant Ave., near Forest St., Ward 20, for Otho R. Reed, dwell., 22′ x 31′ and 16′ x 16′, two-st'y pitch; Otho R. Reed, builder.

Union St., near Foster St., Ward 25, for John Dargon, dwell., 24′ x 33′ and 15′ x 18′, two-st'y pitch; Pierce Quirk, builder.

Sheldon St., near Ashland St., Ward 23, for J. Henry Littlefield, dwell., 20′ x 30′ and 12′ x 15′, two-st'y pitch; Alexander Rogers, builder.

Border St., No. 282, Ward 1, for Wm. F. Green & Son, carriage-shed, 15′ x 20′, one-st'y pitch; James Quirk, builder.

Washington St., near Valentine St., Ward 21, for Mrs. John Mahony, 2 dwells., 21′ x 40′ and 15′ x 20′, three-st'y pitch; Samuel Rantin, builder.

Union Ave., Ward 23, for Michael Mahony, stable, 14′ x 20′, one-st'y pitch; J. B. McKay, builder.

Washington St., near Williams St., Ward 23, for Andrew Doyle, dwell., 22′ x 30′, two-st'y pitch.

Greenwich St., near Commercial St., Ward 24, for John Holland, dwell., 20′ x 25′, two-st'y pitch; Edward Porter, builder.

Brooklyn.

Memorial Chapel. — The members of Christ Church Society, on Bedford Ave., are to build a memorial chapel to the late Rev. A. H. Partridge.

Building Permits. — *Fourth Ave.*, w s, 80′ s Pacific St., three-st'y brick dwell., tin roof; cost, $7,000; owner, Robert Hutson, Pacific St., near Fourth Ave.; architect, M. J. Morrell; builders, P. J. Carlin and J. S. McRea.

Adams St., s s, 175′ e Broadway, three-st'y frame dwell., tin roof; cost, $3,500; owner and builder, Chas. Meyer, 51 Varet St.; architect, J. Herr.

Dupont St., No. 71, n s, 200′ e Franklin Ave., three-st'y frame double tenement, gravel roof; cost, $4,300; owner, Ferdinand Bock, 246 Franklin St.; architect, F. Weber; builders, I. Reed and A. Lange.

Park Ave., s s, 287′ e Marcy Ave., 3 three-st'y frame double tenements, gravel roofs; cost, each, $2,000; owner and builder, Geo. Sutton; architect, T. F. Thomas.

On the pier north from Joralemon St., one-st'y frame freight-shed, gravel roof; cost, $8,000; owners, Cushman & Co.

Dean St., s s, 160′ w Troy Ave., three-st'y basement brick building, tin roof; cost, $30,000; owner, Howard Colored Orphan Asylum, Dean St., near Troy Ave.; architect, W. A. Mundell; builders, C. Cameron and Wright & Brook.

Vanderbilt Ave., e s, 320′ s Willoughby Ave., one-st'y brick greenhouse, glass roof; cost, $8,000; owner, Chas. Pratt, Clinton Ave.; architect, E. L. Roberts; builders, J. Loch and Lord & Burnham.

Oakland St., n e cor. Freeman St., three-st'y frame store and double tenement, gravel roof; cost, $4,500; owner, Abner Ross, on premises; architect, F. Weber; builders, J. Cashman and A. Van Dien.

Broadway, n w cor. Lewis Ave., three-st'y frame store and dwell. and three-st'y frame flat, tin roofs; cost, $9,000; owner, John Kramer, Floyd St.; architect, T. Englehardt.

Broadway, s s, 200′ e Ninth St., four-st'y brick double flat, tin roof; owner, C. Douselman, Broadway, cor. Division Ave.; builder, M. Smith.

Third Ave., e s, 20′ n Fortieth St., 2 three-st'y frame tenements, tin roof; cost, $4,000; owner, Michael Hanrehan, Fifth Ave., cor. Twentieth St.; architect, F. Ryan; builders, Spence Bros.

Twenty-seventh St., s s, 300′ w Fourth Ave., 2 three-st'y frame tenements, gravel roofs; cost, $5,000; owner, John Kenney, 202 Twenty-first St.; architect, P. Kelly.

Ninth St., n s, 97′ 10″ e Sixth Ave., 2 three-st'y and basement brownstone front dwells., tin roofs and cornice; cost, each, $11,600; owner and builder, John Doud, 389 Ninth St.; architect, L. J. Wells.

Ninth St., s s, 775′ 9″ w Second Ave., one-st'y frame factory and rolling-mill, asbestos roofing; cost, $16,000; owner, Russell Iron Co., 11 Pine St., New York; architect and builder, J. Roberts.

Fifty-second St., s s, about 180′ e Fourth Ave., 3 two-st'y frame dwells., tin roofs; cost, each, about $800; owners, Jas. Bower, Wm. Higgins and Wm. E. Thompson, Fifty-third St., near Fourth Ave.; architect, J. Bower; builders, Bower & Thompson.

St. James Pl., e s, 100′ n Gates Ave., three-st'y brick dwell., tin roof; cost, $10,000; owner, Mrs. Garbut, 147 St. James Pl.; architect, A. Hill; builder, B. Linikin.

Walworth St., s e cor. Park Pl., three-st'y and basement brick factory, gravel roof; cost, about $10,000; owners, Hitchcock, Dermody & Co., on premises; architect, I. D. Reynolds; builders, P. R. Kelly and G. F. Chapman.

Chicago.

Houses. — Mr. Theo Karls has prepared plans for 2 three-st'y dwells., 40′ x 70′, for Mr. M. Brand, on Erie St., to cost $15,000.

Messrs. Burling & Whitehouse, architects, have completed plans for 4 two-st'y dwells., to be built for B. Sheldon, on St. Clair St., to cost $20,000.

Mr. L. D. Lauthus is building 5 two-st'y dwells. on California Ave., to cost $20,000; W. Strippleman, architect.

Stores and Flats. — B. G. Olsen, architect, has completed plans for three-st'y store and flats, for Mr. C. C. Lee, 50′ x 70′; cost, $22,000.

Bauer & Hill, architects, have completed plans for three-st'y flats, 40′ x 110′, to be built for Mr. Edward Foster; cost, $30,000.

Mr. C. O. Hanson, architect, has completed plans for 2 two-st'y flats, 44′ x 63′, to be built on Fowler St., for Mr. N. F. Quales; cost, $10,000.

Hotel. — Mr. W. A. Furber is architect for a four-st'y hotel and stores, for Mr. D. W. Potter, to be built on East Chicago Ave.; cost, $10,000.

Building Permits. — A. F. Mueller, two-st'y dwell., 1053 West Adams St.; cost, $4,000.

L. P. Dean, three-st'y and basement dwell., 591 West Monroe St.; cost, $6,000; architect, W. L. Carroll; builder, W. H. Madden.

Mrs. F. Schell, 2 two-st'y dwells., 3010 and 3012 Groveland Park Ave.; cost, $7,000; architect, W. Arrnd; builder, Chas. Cheile.

John Azgren, two-st'y store and dwell., 699 Larrabee St.; cost, $3,200; architect, John Otto; builder, Chas. Lindstrom.

R. O. Pitz, two-st'y dwell., 262 Maxwell St.; cost, $3,200.

E. Goodridge, two-st'y dwell., rear 83 South Peoria St.; cost, $3,200.

George L. Frank, two-st'y store and dwell., 320 North Ave.; cost, $3,500.

John Belz, 2 two-st'y dwells., 645 and 647 North Robey St.; cost, $12,000; builder, Geo. Hinchliff.

John Sullivan, two-st'y dwell., 331 Lincoln St.; cost, $3,500; architect, B. Hoganson.

Albert Inges, two-st'y shop and dwell., 490 North Wells St.; cost, $2,000.

N. T. Quales, 2 two-st'y flats, 54 and 56 Fowler St.; cost, $10,000; architect, C. O. Hanson; builder, H. Hagenow.

F. P. Keilmann, three-st'y store and flats, 220 Lincoln Ave.; cost, $10,000; architect, Jno. Bruhurs; builder, T. Nehls.

Daniel Freeman, two-st'y dwell., 48 Gano St.; cost, $3,000; architect, Jas. H. Morse; builder, D. Freeman.

Geo. Bodner & Bro., three-st'y flats and barn, 436 and 438 East Division St.; cost, $17,000.

Chicago Manual Training School, four-st'y training-school, 349–353 Michigan Ave.; cost, $20,000; architect, A. S. Beeman; builders, Agnew & Cox.

Peter Roth, two-st'y flats, 411 Twenty-sixth St.; cost, $4,500.

Val Mueller, three-st'y store and dwell., 504 Larrabee St.; cost, $7,000; architect, H. Serks; builder, Chas. Hellmann.

Fred. Grend, three-st'y flats, 325 North Clark St.; cost, $6,000; architect, T. Karls; builder, B. Reifulanger.

Ed. Foster, three-st'y and basement flats, 519–527 Belden St.; cost, $30,000; architects, Bauer & Hill; builder, G. Loeffker.

Geo. Gunther, two-st'y store and dwell., 1473 Thirty-fifth St.; cost, $4,000.

Henry Schade, two-st'y flats, 505 Larrabee St.; cost, $6,000; builder, Aug. Newmann.

Jacob Deutsch, dwell., 72 Evergreen Ave.; cost, $4,000.

Christ. Minch, three-st'y store and dwell., 3165 Archer Ave.; cost, $8,000; architect, R. W. Ruehl; builders, King & Dennith.

C. C. Lee, three-st'y store and flats, 464 and 466 West Madison St.; cost, $22,000; architect, B. G. Olsen; builder, W. F. Grant.

E. C. Howard, 2 two-st'y dwells., 14 and 16 Kedzie Ave.; cost, $5,000; architect, C. C. Howard.

Christ. Hartsel, two-st'y dwell., 866 West Twenty-first St.; cost, $6,200; builder, Wm. Egebrooht.

C. H. Foster, three-st'y dwell., 3133 Calumet Ave.; cost, $6,000; architect, C. Chapman; builders, Bodmer & Bro.

Joseph Page, three-st'y dwell., 210 Bissell St.; cost, $3,000; architect, J. Schneizer; builders, K. & Westphal.

E. S. Dreyer, 2 two-st'y dwells., 823 and 825 North Clark St.; cost, $20,000; architect, H. M. Hanson; builder, Geo. Sries.

Wm. Kerfoot & Co., 5 cottages, 331 to 345 North Robey St.; cost, $10,000.

W. D. Kerfoot & Co., 6 cottages, 332 to 342 Hoyne Ave.; cost, $11,400.

Cincinnati.

Builders Busy. — The President of the Builders' Exchange, Elwood Cuezy, says he has never known builders to be so pressed with work as now. The activity began immediately after the February flood, being caused so early in the season by the necessity of repairing injured buildings and replacing those which were washed away. By the time that work was done, the regular building season opened. The number of new buildings proposed to be erected has exceeded the ability of the trade to erect. There have been no troublesome strikes, and contractors and mechanics are having the most profitable summer which they remember.

Denver, Col.

Business Blocks. — Colorado Mortgage and Improvement Co., five-st'y store and brick building, 100′ x 125′, Larimer St.; cost, $150,000; J. W. Roberts, architect.

G. G. Symes, three-st'y brick business block, 50′ x 125′, Champa St.; cost, $26,000; W. H. J. Nichols, architect.

George Tritch, five stores, 40′ x 75′, Seventeenth St.; cost, $6,000.

M. D. Curvigan, two-st'y brick business block, 50′ x 60′, Lawrence St.; cost, $5,500.

Denver Orphan Home Asylum. — Two-and-one half-st'y brick building, 50′ x 54′, Page St.; cost, $10,000; W. H. J. Nichols, architect; Norton & Le Duc, builders.

Dwelling. — W. H. Lyon, two-st'y brick dwell., 48′ x 65′, Glenarm St,; cost, $10,000; Wm. Quayle, architect.

Machine Shops. — H. N. Nichols & Co., Wynkoop St.; cost, $10,000; Hallack & Howard, builders.

New York.

Factory. — Messrs. Jas. Pyle & Son will have built a seven-st'y factory, first story iron, above brick and stone, 80′ x 99′, to be built from designs of Mr. Thos. R. Jackson, on the s w cor. of Greenwich and Vestry Sts., to cost $100,000.

Warehouses. — For Mr. E. K. Ely, 4 six-st'y brick warehouses are to be built on the west side of Greenwich St., 129′ n of Canal St., covering a plot of

ground 80′ x 139′. The cost will be about $100,000. Mr. Jno. McIntyre is the owner.

Building Permits. — *Sixty-fourth St.*, s s, 120′ w Fourth Ave., 2 four-st'y brownstone front dwells., tin roofs; cost, $20,000; owner, Thos. Reid, 327 West Fifty-seventh St.; architect, John Prague; day's work.

Eighty-second St., n s, 73′ w Third Ave., four-st'y brick tenement and store, tin roof; cost, $6,000; owner, Patrick Corbitt, 634 Broadway; architect, Wm. Baker; builder, Thos. Bennett.

Third Ave. Nos. 797 *and* 799, seven-st'y brick factory, tin roof; owner, Peter A. Cassidy, 118 East Forty-fifth St.; architect, Chas. Sturtzkober.

Fifty-sixth St., s s, 250′ e Seventh Ave., 2 three-st'y brick stables, tin roof; cost, $12,000; owner, Miguel Garcia, 63 Broadway; architect, Robert Mook; builders, A. A. Andrews & Son and W. Germond & Co.

Ninetieth St., n s, 220′ e Fifth Ave., four-st'y brownstone front dwell., tin roof; cost, $50,000; owner, Mrs. Marian S. Warshing, 1628 Second Ave.; architect, John C. Burne.

Clark St., No. 20, five-st'y brick factory, tin roof; owner, Lewis Moore, 25 Vandam St.

South Fifth St., No. 131, five-st'y brick factory, tin roof; cost, $17,500; owner, Mrs. Kunigunde Ode, 19 Charlton St.; architect, J. M. Grenell; builder, O. E. Perrine.

One Hundred and Fortieth St., s s, 158′ 10′ e Third Ave., 2 four-st'y brick tenements, tin roofs; cost, $12,000; owner, Geo. A. Haggerty, 803 Third Ave.; architects, Thom & Wilson.

Alterations. — *Fifth Ave., No.* 111, is to be connected with the adjoining residence on the n e cor. of Fifth Ave. and Eighteenth St., and extensive alterations and improvements made by the owner, Mr. August Belmont.

Vandewater St., Nos. 17 to 28, repair damage by fire; cost, $40,000; owner, Geo. Munro, 15 West Fifty-seventh St.; architect, John Correjo; builders, R. L. Darragh and Edmund Gridley.

Philadelphia.

Building Permits. — *Tackawanna St.*, s Orthodox St., 2 three-st'y dwells., 14′ x 30′; Amos H. Taylor, contractor.

Kimball St., w Twenty-first St., 10 two-st'y dwells., 14′ x 27′; Robert Kaighn, owner.

Queen St., w Thirty-sixth St., 6 three-st'y dwells., 16′ x 32′; C. C. Linnehan, contractor.

Effingham St., n w cor. Tasker St., 2 two-st'y dwells., 16′ x 35′; Wm. Rowan, owner.

Dauphin St., w Tenth St., two-st'y dwell. and stable, 17′ x 40′; A. Kurtz, owner.

North Front St., rear of Nos. 210 *and* 214, four-st'y addition to bakery, 21′ x 100′; Richards & Shourds, contractors.

Thirty-third St., cor. Columbia Ave., one-st'y addition to hotel, 32′ x 70′; J. B. Doyle, contractor.

North Front St., No. 1741, second and third story addition to building, 20′ x 50′; E. Schmidt, contractor.

Hanley St., bet. Wharton and Reed Sts., 4 two-st'y dwells., 15′ x 30′; A. M. Green, owner.

Palethorp St., bet. Somerset St. and Lehigh Ave., 2 two-st'y dwells., 16′ x 38′; Valentine Lent, contractor.

Seventh St., n Cumberland St., 2 two-st'y dwells., 15′ x 45′; H. M. Housekeeper, owner.

Franklin St., n Cumberland St., 2 two-st'y dwells., 15′ x 45′; H. M. Housekeeper, owner.

Kensington Ave., n Adams St., three-st'y dwell. and store, 17′ x 50′; Dickson Bros., contractors.

Germantown Ave., 2 two-st'y dwells., 16′ x 48′; H. L. Lovett, contractor.

McAlpine St., bet. Locust and Walnut Sts., two-st'y dwell., 16′ x 62′; J. Drummond, owner.

Sixth St., n Venango St., two-st'y dwell., 16′ x 45′; James Dorft, contractor.

Cogshall Ave., bet. Lehman and Rittenhouse Sts., 4 two-st'y dwells., three 14′ x 28′, one 18′ x 47′; D. S. McNabb, contractor.

Lambert St., n Diamond St., 18 two-st'y dwells., 16′ x 42′; J. N. Pattison, owner.

Sixteenth St., bet. Wharton and Reed Sts., 17 three-st'y dwells., 16′ x 42′; Hall & Garrison, owners.

Nevada St., No. 1127, two-st'y dwell., 16′ x 42′; C. E. Duffe.

Ontario St., e Eighteenth St., 2 three-st'y dwells., 18′ x 48′; H. A. Miller, contractor.

Girard College Grounds, building, 125′ x 150′; W. F. Wilkins, contractor.

Forty-eighth St., s Westminster St., two-st'y dwell., 18′ x 45′, Lewis Schmidt, contractor.

Dorrance St., No. 1526, two-st'y dwell., 16′ x 38′; Samuel Haddock, owner.

Nicetown, one-st'y machine shop for Midvale Steel Co.; T. H. Dean, contractor.

Leiper St., n Allen St., three-st'y dwell., 40′ x 40′; Wendell & Smith, contractors.

Bridge St., e Melrose St., one-st'y factory, 30′ x 36′; Wendell & Smith, contractors.

Tacony St., w Kennedy St., two-st'y dwell., 18′ x 48′; R. C. Foster, contractor.

Thirty-fourth St., n Race St., 2 three-st'y dwells., 22′ x 74′; W. W. Borzorth, contractor.

C St., No. 2813, two-st'y dwell., 16′ x 45′; D. C. Schuler, contractor.

Oxford Road, bet. Pennsylvania and Franklin Sts., Frankford, two-st'y dwell., 16′ x 41′; Chas. Sluger, owner.

Brown St., No. 328, two-st'y stable, 16′ x 30′; Lewis Walter, contractor.

Bethlehem Pike, n w New St., three-st'y dwell., 40′ x 40′; W. C. Mackie, contractor.

Adrian St., No. 1520, three-st'y dwell., 18′ x 28′; Shegog & Quigley, contractors.

Canal Bank, s Green Lane, two-st'y addition to storehouse, 35′ x 73′; J. A. Davis, contractor.

Market St., Nos. 3809 *and* 3811, two-st'y addition to stable, 21′ x 30′; B. Jacobs & Son, owners.

Bridge St., bet. Richmond and Orchard Sts., two-st'y store, 17′ x 33′; Amos W. Linn, contractor.

Pharo St., No. 757, two-st'y dwell., 15′ x 28′; G. W. McCaffrey, owner.

St. Louis.

Building Permits. — Seventy-seven permits have been issued since our last report: twenty-three are for unimportant frame houses; of the rest those worth $2,500 and over are as follows: —

George Hannibal, 2 adjacent two-st'y brick dwells.; cost, $5,000; Goesse, architect; Goesse & Remmers, contractors.

Goesse & Remmers, two-st'y brick dwell.; cost, $5,500; Goesse, architect; Goesse & Remmers, contractors.

Mrs. E. G. Furstern, two-st'y brick dwell.; cost, $3,700; J. B. Legg, architect; R. F. Park, contractor.

Fred. Paulmann, double two-st'y brick dwell.; cost, $4,500; Peipers, architect; Daniel Paulus, contractor.

Wm. Cropp, two-st'y brick dwell.; cost, $4,000; H. Ellermann, contractor.

R. N. Newberry, two-st'y brick dwell.; cost, $3,000; R. N. Newberry, contractor.

M. Bernheimer, two-st'y brick warehouse; cost, $30,000; A. Grable, architect; sub-let.

Our Lady of Mount Carmile School Association, two-st'y brick school-house; cost, $8,000; James Gillick, contractor.

St. Louis Mutual House Building Co. No. 3, two-st'y brick dwell.; cost, $3,800; Ed. Mortimer, architect; Remmers & Thomsen, contractors.

John Baur, two-st'y brick dwell.; cost, $3,460; Ed. Mortimer, architect; J. H. Dunlap, contractor.

John Baur, two-st'y brick dwell.; cost, $3,460; Ed. Mortimer, architect; J. H. Dunlap, contractor.

Henry Renstidele, two-st'y brick warehouse; cost, $8,000; Wm. Bourmans, architect; D. J. Dempsey, contractor.

Fritz Brunte, two-st'y brick dwell.; cost, $2,500; H. Hagen, contractor.

Isaac H. Walker (N. Y. City), 2 adjacent two-st'y brick dwells.; cost, $7,500; W. M. Walker, architect; J. E. Donnelly, contractor.

Isaac H. Walker (N. Y. City), 4 adjacent two-st'y brick dwells.; cost, $15,000; W. M. Walker, architect; J. E. Donnelly, contractor.

Wm. Daman, two-st'y brick dwell.; cost, $5,000; Slicer, architect; Wm. Daman, contractor.

Washington.

Building Permits. — The following permits for new buildings valued at $3,000 or over have been issued since last report: —

Two two-st'y brick dwells., S St., bet. Twelfth and Thirteenth Sts., n w, for Geo. Francis; cost, $17,000; P. M. McCartney, builder.

Three st'y brick dwell., N St., near Connecticut Ave.; n w, for Asa Whitehead; cost, $8,000.

Two-st'y brick dwell., Massachusetts Ave., bet. Sixth and Seventh Sts., e, for R. L. Ford; cost, $5,000; E. S. Frederick, architect; J. C. Yost, builder.

Three-st'y brick store and dwell., Connecticut Ave., bet. L and M Sts., n w, for W. D. Peachy; cost, $10,000; C. H. Reed, Jr., architect.

Four-st'y brick college, to be known as Columbian University, cor. Fifteenth and H Sts., n w; cost, $75,000; W. M. Poindexter, architect; W. C. Morrison, builder.

Three-st'y brick dwell., Massachusetts Ave., bet. Seventeenth and Eighteenth Sts., n w, for A. O. Aldis; cost, $15,000; Hornblower & Marshall, architects; Dearing & Johnson, builders.

Two-st'y brick store and dwell., Eighth St., bet. D and E Sts., s e, for David Nackman; cost, $4,400; C. C. Meads, builder.

Three-st'y brick dwell., Eleventh St., bet. K and L Sts., n w, for G. W. Uttermekle; cost, $6,500.

Three three-st'y brick dwells., Massachusetts Ave., bet. Fourteenth and Fifteenth Sts., n w, for Commodore Sicard; cost, $12 000; David T. Cissel, builder.

Two three-st'y brick dwells., M St., bet. Seventeenth and Eighteenth Sts., n w, for R. C. Packer; cost, $12,000; F. G. Atchison, architect; Crawford & Deggs, builders.

Three-st'y brick dwell., Fifth St., near F St., n w, for Jas. L. Morris; cost, $5,000; Z. Downing, builder.

Two three-st'y brick dwells., Twenty-first St., bet. L and M Sts., n w, for Mary A. Deggs; cost, $7,000; Daniel Murray, builder.

General Notes.

Aurora, Ill. — S. F. Hobbs, Treasurer, received, August 13, proposals for building the Aurora Cotton Mills.

Brookline, Mass. — Alterations are being made on Mr. P. Olsen's house, on Corey Hill, at an expense of $7,000; O. F. Smith, architect.

Cohoes, N. Y. — It is the purpose of the people of St. Joseph's Catholic Church (French) to erect on Simmons Island a fine convent, to cost from $60,000 to $75,000.

Crown Point, Ind. — Brick almshouse; J. C. Cochrane, architect, Chicago; cost, $16,000.

Also, a store for Warren Cole; cost, $4,500.

Also, a block of stores, 27 and 29 Michigan Ave., for O'Neil Bros.; cost, $25,000.

Danville, Va. — A building for "the Danville College for Young Ladies" is being built, at a cost of $20,000; Albert West, Richmond, Va., architect.

Manasquan, N. J. — Bids are now being made on the plans for the new school-house prepared by Frederick B. White, architect, of New York. The building is to be of brick, 82′ x 96′.

Manayunk, Pa. — James M. Preston is building a large four-st'y storehouse on the River Road, to be used in the future for a mill site.

Meriden, Conn. — The Charles Parker Company is building a new brick factory, 60′ x 100′.

Middleboro, Mass. — The new organ-factory is to be located on land of Joseph L. Pease.

Middletown, Conn. — The Wilcox, Crittenden & Co. Corporation is about to build a workshop, 60′ x 80′.

Contracts are about to be let for a Chapter-House for the Middletown Chapter of Alpha Delta Phi, to be erected on the corner of High and Cross Sts., near the college buildings, to cost about $18,000; architect, Chas. S. Edgerton, of Albany, N. Y.

Mt. Carmel, Pa. — The corner-stone of the new Church of God, at this place, was laid August 12.

Newton, Mass. — Mr. O. F. Smith, of Boston, is the architect of a house for Dr. Sylvester. It measures 38′ x 42′, two-st'y, hip roof.

Northampton, Mass. — W. F. Pratt & Son have just finished plans for the brick and stone storehouse to be built on the hospital grounds. It will be three stories high, with a basement. The main part will be 32′ 6″ x 96′, with two ells, 22′ 6″ x 23′.

Princeton, N. J. — Mr. F. B. White is preparing plans for the new Whig Hall, to cost $30,000.

Roxbury, Mass. — Messrs. Rotch & Tilden are the architects of a brick and frame building for Mrs. Ellen M. Gifford. It measures 35′ x 55′, and is to be used as a sheltering-home for animals.

San Francisco, Cal. — Mr. Charles Crocker has authorized a builder to draw upon him for the sum of $10,000, to restore the Golden Gate Park conservatory, which was destroyed by fire nearly a year ago.

Vergennes, Vt. — The Vermont Shade Roller Company have decided to rebuild their factory. The new building will be 60′ x 128′, two stories high, with a brick front.

Yonkers, N. Y. — A brick primary school, about 70′ square, is to be erected on Hamilton Ave., from designs of Messrs. D. & J. Jardine, of New York.

Yonkers will have a new opera-house on Warburton Ave. Its cost will be $30,000.

LATEST.

Brooklyn.

Building Permits. — *Thirteenth St.*, s s, 175′ e Seventh Ave., 10 two-st'y brick tenements, tin roofs; cost, each about $3,500; owner, M. A. Wood, 78 Fifteenth St.; architect, F. McCormack; builders, —— Brammer, and McCormack & Wood.

Greenpoint Ave., 175′ e Oakland Ave., three-st'y brick double tenement, tin roof; cost, $7,000; owner, O. McCarren, Greenpoint Ave.; architect, J. Mulhall; builder, J. Rooney.

Kingsland Ave., w s, 100′ n Herbert St., three-st'y frame double tenement, tin roof; cost, $5,000; owner, Thos. Farrell, 13 Division St.; builder, R. Ferguson.

Halsey St., n s, 100′ w Reid Ave., 3 two-st'y and attic brownstone front dwells.; cost, each $3,300; owner, architect and builder, Essex Roberts, 1637 Atlantic Ave.; mason, P. Donlan.

Myrtle St., n s, 100′ e Evergreen Ave., two-st'y frame tenement, tin roof; cost, $3,900; owner, Geo. Schoener, 12 Stagg St.; architect, F. Holmberg; builders, A. Grasmann and J. Rueger.

Vanderbilt Ave., e s, about 150′ s Greene Ave., two-st'y brick stable, slate and tin roof; cost, $10,000; owner, C. N. Hoagland; architects, Parfitt Bros.; builders, T. B. Rutan and Morris & Selover.

Park Pl., s s, 100′ e Broadway, two-st'y frame tenement, tin roof; cost, $3,550; owner, Adolph Volkert, Park Ave.; architect, F. Holmberg; builder, J. Rueger.

Wolcott St., w s, 160′ n Conover St., three-st'y frame double tenement, tin roof; cost, $4,000; owner, — Cooper, Conover St., cor. Sullivan St.; architect and builder, C. Detlefsen.

Himrod St., n s, 140′ e Evergreen Ave., 2 two-st'y frame dwells., tin roofs; cost, $2,500; owner, architect and builder, Ernest Loerch, 61 Himrod St.; carpenter, J. Rueger.

Fifth St., No. 268, e s, 60′ North Fifth St., four-st'y brick store and double tenement, tin roof, iron cornices; cost, $5,000; owner, Fritz Westphal, 89 North Fifth St.; architect, A. Herbert; builder, J. Schoch.

Eighteenth St., n s, 325′ e Eighth Ave., three-st'y brick factory, tin roof; cost, $6,000; owner, Pacific Tucking Co.; architect, M. Thomas; builders, J. F. Nelson and L. W. Seaman, Jr.

New York.

Building Permits. — *Seventy-third St.*, s s, 275′ w Ninth Ave., three-st'y and basement brownstone front dwell., tin roof; owner, Robt. W. Marsh, 481 Washington Ave., Brooklyn; architect, M. C. Merritt.

West Thirty-second St., Nos. 251 *to* 261, one-st'y brick church, gravel and tin roof; cost, $20,000; owners, Board of Trustees of the Gospel Tabernacle, Albert B. Simpson, 331 West Thirty-fourth St.; architect, A. Namm; builder, Chas. R. Hadden.

Sixteenth St., w s, 410′ e Ave. C, three-st'y and attic brick hospital, slate and tin roof; cost, $50,000; owner, City of New York (Board of Health, 301 Mott St.); architect, Chas. C. Haight.

Fifty-sixth St., n s, 100′ w First Ave., one-st'y coal-shed, gravel roof; cost, $3,000; owner, Walter Shriver, 116 Fourth Ave.; architect, A. B. Ogden; builder, Geo. T. Dollinger.

Fifty-second St., n s, 275′ w Sixth Ave., 3 three-st'y brick stables, tin roofs; cost, about $12,000; owners and builders, McCafferty & Buckley; architect, R. W. Buckley.

One Hundred and Forty-Sixth St., n s, 116′ 9″ e Third Ave., four-st'y frame tenement, tin roof; cost, $7,500; owner, Theo. Ebeling, 474′ n Third St., architect, Adolph Pfeiffer.

East Ninety-Second St., Nos. 156 and 158, 2 five-st'y brick tenements, tin roofs; cost, $13,000; owner, Catherine Fettrich, 148′ w One Hundred and Twenty-Fifth St.; architect, D. J. McRae; builder, John Fettrich.

Tenth Ave., n e cor. Nineteenth St., 3 five-st'y brick tenements and stores, and 1 four-st'y brick tenement, tin roofs; cost, 3, $18,000, and 1, $15,000; owner, Edward Conlon, 111 Albany Ave., Brooklyn; architect, Elbert D. Howes.

Washington Ave., No. 1345; two-st'y frame dwell., tin roof; cost, $4,500; owner, Patrick Connor, 1347 Washington Ave.; architect, W. W. Gardiner.

Third Ave., w s 144′ s One Hundred and Sixty-Sixth St., three-st'y brick tenement and store, tin roof; cost, $9,000; owner, Emil Wendler, 1095 n Third Ave.; architect, W. W. Gardiner.

Alterations. — *Canal St., No.* 60, four-st'y brick extension, tin roof, new stone front and internal alterations; cost, $4,000; owner, Siemon Liebowitz, 75 Hester St.; architect, Wm. Grant.

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CONTENTS.

THE Seventeenth Annual Convention of the American Institute of Architects will open in the rooms of the Providence Art Club, No. 35 North Main Street, Providence, R. I., at 10 A. M., on Wednesday next, August 29. The first business will be the Annual Address of President Walter, and this will be followed by the usual reports of officers and committees. After the consideration of these reports, which are this year of special importance, lunch will be served at the Narragansett Hotel, and the afternoon will be spent in driving about the city and visiting the most interesting public and private buildings. In the evening a lecture will be given on Strength of Materials, from Actual Tests, by Professor Lanza of the Massachusetts Institute of Technology, with lantern illustrations of different forms of rupture in large timbers under breaking stress. This will be followed by the reading of two papers, one on Architectural Competitions, by Mr. John A. Fox of Boston, and the other on the Conduct of the Office of Supervising Architect, by Mr. William A. Potter of New York, late Supervising Architect of the Treasury Department. The business meeting of the second day will be held in the same place at 9.30 A. M., and will be occupied with the election of officers and standing committees, and the consideration of reports, with such other matters as may be brought up. At eleven o'clock the meeting will be adjourned, and the members of the Convention will take the steamer for Rocky Point, where dinner will be served, and at three o'clock the voyage will be continued to Newport. At eight o'clock the same evening a meeting will be held at the Ocean House, for the consideration of unfinished business, and papers will be read by Mr. Arthur Rotch of Boston, on a subject to be announced, and by Mr. T. M. Clark of Boston, on the Architect as a Sanitarian. The third day will be left clear for enjoyment, and at 10 A. M., carriages will leave the Ocean House for a drive about the city, and visits to several private cottages, returning in time for dinner at the Casino at 2 P. M., after which the Convention will adjourn. Arrangements have been made for the accommodation of members at the Narragansett Hotel in Providence at the reduced rate of two dollars and a half a day, and at the Ocean House in Newport at four dollars a day. It is probable that the attendance will be large, and those who intend to be present are requested to send their names to any member of the Committee of Arrangements, which consists of Messrs. Alfred Stone and Thomas J. Gould of Providence, and Mr. Geo. C. Mason, Jr., of Newport.

TWO of our correspondents send us this week copies of "invitations to architects." One of them requests "full plans and details," "specifications and estimates perfect and complete," for a building to cost twenty-five thousand dollars, and offers "for the plans, details, specifications, etc., which we may select," "a fee of two hundred and fifty dollars." The other "invitation" recites the decision of a certain society "to erect a building not to exceed sixteen thousand dollars in cost," and "to offer fifty dollars to the architect furnishing the most feasible plans and specifications." The invitations in both cases have the air of being put forth in good faith, and while they will raise a smile among the architects who receive them, they are at least far from exciting that scorn which all upright men must feel for the authors of those thinly disguised frauds by which young architects are tempted, under the delusive hope of meriting employment, to spend their time and labor for the benefit of tricksters whose arrangements for professional service have been already made, with reference, it need hardly be said, to their private interests. Even with the best intentions, however, the persons responsible for such propositions deserve as little gratitude from the bodies which they represent as they do from the profession which they hold so cheap. There are two sorts of individuals who occasionally respond to invitations of this kind: one includes young men who have some idea of drawing, but know nothing more of an architect's work or responsibility; the other is composed of persons of questionable reputation, who understand something of the art of building, and of the inadequacy of the reward offered to the service required, but count upon the success of methods known to them for making their clients pay liberally "through the nose" for what they think they are getting below the market price. This latter class, with the help of the mutual countenance and support which the architectural societies now foster in the profession, is being rapidly driven out of existence, while the number of draughtsmen disposed to advertise their incapacity by participation in such struggles also grows daily less. It will not be long, we trust, before it is reduced to nothing, and the practice of architectural competitions here is brought back to that current in all other civilized nations, under which the cost of securing a choice among a number of designs for a given building falls upon the owner of the proposed building, and is an addition to the regular percentage upon the cost of the structure, which he is obliged to pay in any case to the person to whom he confides the work. It is worth while to remember that in the places where this view of the subject prevails, architects are quite as much employed, and competitions are far more in vogue, than they are here; while building committees there obtain a satisfactory equivalent for the money which they expend in that way, by professional service which neither involves them in costly failures or mistakes nor renders them and their building ridiculous.

THROUGH the kindness of a correspondent in San Francisco we are put in possession of a copy of the new plumbing ordinance of that city, which went into effect on the first of August. In general, the ordinance resembles that of Boston, both of them being virtually abridgments of the New York law, the first one put in force. The California regulations have, however, some features peculiar to themselves, the most remarkable being a provision requiring all waste-pipes from all interior plumbing, exclusive of water-closets and kitchen sinks, to discharge into an open, trapped hopper. This regulation, compliance with which presents no difficulty in the warm, uniform climate of San Francisco, is borrowed from the English practice of disconnection once so much in vogue, and its adoption certainly indicates a creditable research and comprehension of the subject on the part of the Board of Health, but, after some experience with such disconnection we should be sorry to be compelled to adopt it in all cases, even in a favorable climate. If no exception were made to the wastes required to discharge over the hopper, the gases from the sewer would in this way be prevented, if the traps should dry out, from discharging directly into the house, but a neglected closet trap forms as good a conduit for sewer-gas as any other, while the outside hopper, lined with the slime from wash-basins and slop-sinks, is anything but a pleasant object to have under one's windows. In regard to the testing of soil-pipes, the rules prescribe the uncompromising method of filling with water to the top. If this is literally carried out, we hope that a school for plumbers will be established in San Francisco, for the number of stacks of iron soil-pipe with lead joints east of the Rocky Mountains which would stand such a test is small indeed. It is unfortunate that nothing is said about a similar test for the iron vent-pipes, which need it quite as much as the soil-pipes themselves, but that is an omission which can be easily supplied, and an excellent addition to the provisions regarding air-pipes, requiring them to be laid with a continuous fall, to avoid collecting water by condensation, is worthy of being copied in all new ordinances of the kind.

AFTER many months of hesitation, the American Heat and Power Company in New York has succumbed to an accumulation of mistakes and misfortunes, and placed its property in the hands of a receiver, while the holders of the Company's bonds have begun a suit for foreclosure and sale, which will alienate the last vestiges of interest possessed by the company in the plant which has cost it so much. The total expenditure upon pipes and buildings has been about six hundred thousand dollars, and it was not until the best authority had pronounced the entire system worthless for practical use that the managers decided to abandon what had been already invested rather than pay the immense cost of a complete renewal of the work. Even the bond-holders, as it seems, will get back very little of the money lent on the security of pipes buried in the ground. The charter, which might have some value, has been allowed to expire, and the pipes, which cannot be used in their present condition, are hardly worth enough, as old iron, to pay the cost of digging them up. The rival corporation, the New York Steam Company, has met with a success which seems all the more striking in contrast with the misfortunes of the other. At present, this company has four miles of main pipe laid in the streets, and supplies two hundred buildings with steam, using five thousand horse-power in winter, and two thousand in summer. According to the *Evening Post* no failure has occurred in the pipes or valves used by the corporation since it first began to deliver steam in the spring of 1882, except where trifling injury has been done by external means; a telegraph pole, for instance, having been driven through one of the pipes.

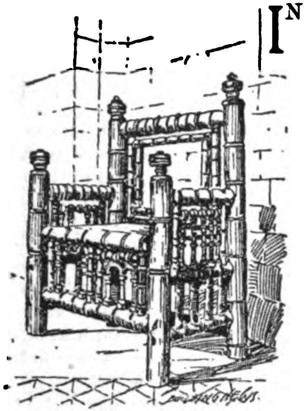
ACCORDING to the *Scientific American*, the new conduit for supplying Virginia City, Nevada, with water, is built, for the sake of economy, down one side, and up the other, of a deep valley, which separates the town from the lake used as the source of the water. The bottom of the valley is seventeen hundred and twenty feet below the general line of the conduit, and the water in the pipes at the lowest part is therefore under a head, or hydrostatic pressure, of about eight hundred pounds to the square inch. The water on one side of the valley is conducted in wrought-iron tubes, eleven inches in diameter, and of metal one-quarter of an inch thick, lap-welded, and put together with screw joints. On the other side the pipes are twelve inches in diameter, and riveted. The welded tubes give no trouble, but the riveted pipes frequently fail. Under the immense pressure any imperfection in a seam gives an outlet for a stream of water which, although so slender as to be, perhaps, almost invisible, will cut through anything in its way, and if it falls upon another part of the pipe, will soon perforate it, and either determine the rupture of the whole pipe, or occasion a serious leak. The force of these thread-like jets is said to be so great as to tear the flesh from a hand incautiously held in one of them, and although they may be touched by those curious to feel their iron-like hardness, the side of the finger must be presented to them, instead of the tip, from which the nail is sometimes instantly torn if the current should happen to strike upon it.

OUR readers will remember that the attention of archæologists has been turned of late to the country about the Delta of the Nile, which, as having been one of the most fertile and thickly-settled portions of the world for perhaps ten thousand years, must contain some interesting traces of its early occupants. In the north-eastern portion of the Delta is the place still called San, which marks the site of the ancient city of Tanis, the capital of the Hyksos, or Shepherd Kings, who, although they held Egypt in subjection for five hundred years, kept their court and their riches in the strong frontier town which guarded their way back to the plains of Asia from which they came. Excavations were made here years ago by Mariette Bey, and the well-known seated statue of a Hyksos king, in dark-green basalt, was found, besides traces of many other objects, some having a curiously mingled Asiatic and Egyptian character. Unfortunately, Mariette Bey's explorations were interrupted, and the ruins have since been deserted, but the new society which administers the Egyptian Exploration Fund has determined to recommence the investigation next year. The sum available for the work of the present season was small, so that instead of attacking the Shepherds' capital, a kind of preliminary excavation was made at a place near by, reputed to be the site of Rameses, the treasure city, or magazine, built by King Rameses with the help of the enforced labor of the children of Israel, and named after himself. The search was completely successful, except in the trifling particular that the place proved not to be Rameses but Pithom, the sister treasure city, built by the same means, and at the same time with the other. The buildings of the town consisted almost exclusively of enormous storehouses, built of sun-dried bricks, some of which, in singular confirmation of the Scripture narrative, were made with straw for binding, and others without. Many inscriptions were found on the ruins, proving conclusively that the work was done by command of Rameses II, known as the Great, who has been heretofore generally supposed, but without definite evidence, to have been the Pharaoh of the Israelitish Exodus. The Pharaoh in whose reign Joseph came to Egypt is supposed to have been one of the Hyksos kings, and the kindness shown to him and his brethren may, it is surmised, have been due to a relationship of race between them and the Shepherd conquerors, while this same relationship may very probably have led to the oppression of their descendants after the expulsion of the Shepherds by the native leaders. The researches at Tanis will undoubtedly clear up the mystery, as well as many of the others which surround this strange epoch whose history, although in the Scriptural outline more familiar than any other, presents in its details some of the darkest problems known to students.

THE *Sanitary Engineer*, in a sensible editorial on the sewerage of small towns, introduces its remarks by the assertion that out of nearly two hundred towns in the United States containing between five and ten thousand inhabitants, and having a public water-supply, there are many which certainly have no sewerage system, and more which are believed to be without any; going on to draw the familiar picture of such places, with their houses clustered together on small lots, each with its cesspool, slowly saturating its own and the neighboring cellars with poisonous liquids, and most of them with a foul privy in addition, contributing its stench to the noisome air. We are a little surprised that the *Sanitary Engineer* should be so unfamiliar with the filthy ways of New England cities as to limit its observation to places of only ten thousand inhabitants. To our own knowledge there is at least one city with a population of sixty thousand to which the description quoted applies with literal fidelity; and we have in mind another town of nearly twenty thousand inhabitants, so far civilized as to have at this moment under consideration the expenditure of something like a hundred and fifty thousand dollars for public parks, in which there is not a single foot of public sewer. The reputation of the place for healthfulness, as may be imagined, is none of the best, and the proposition to appropriate for parks a sum which would make a very efficient beginning in providing the town with a thorough system of drainage has to the dispassionate mind something the air of a scheme for dressing up a pig with ribbons, and leading him forth into genteel society.

WE learn from our interesting contemporary, the *Mexican Financier*, some particulars in regard to the asphalt mines of Mexico, which although long known, have only recently attracted the attention of persons disposed to develop them as a part of the resources of that rich country. One of the mines, which is said to be practically inexhaustible, is situated in Central Mexico, about sixty miles from Tampico, and it is estimated that the product, which is pure asphaltum, with hardly a trace of foreign matter, can be delivered at the port of Tampico for eight or ten dollars a ton. Near Vera Cruz is also a large deposit, and asphalt mines are found in one or two other places. We do not learn whether any of the mines furnish the natural mixture of asphaltum with finely comminuted stone which, under the name of "rock asphalt," forms so precious a material for paving; but it would be well worth while to make a thorough search for a substance which would be sure of ready sale in all the large cities of the world. The artificial mixture of asphaltum and ground stone, which is, if we are not mistaken, used for paving the streets of Washington, is, although inferior to the natural product of the Swiss and German mines, of much more value than the brittle coal-tar concretes. Attempts have been made in Mexico to adapt steam furnaces for burning the asphalt as it comes from the mines, but it is to be hoped that a more advantageous use will be found for it before long.

LECTURES ON ARCHITECTURE. — I.



ANCIENT BISHOPS CHAIR
HEREFORD CATHEDRAL. ENG

IN the year 1844, the late Mr. Arthur Gilman delivered a series of twelve lectures on architecture before the Lowell Institute of Boston. The MS. of these lectures was recently submitted to us, and it was proposed at first to publish it entire in the columns of the *American Architect*. But upon examination it proved — as was but natural, since it had been compiled for the instruction of a miscellaneous audience — to be in parts of too elementary a character to find a fitting place in a technical journal. There were, however, many interesting and instructive passages scattered through the different lectures which it seemed a pity should be lost. So it has been decided to publish portions of the MS. only, redistributing the chosen paragraphs when advisable, but altering in no way either the conclusions or the language of the author.

The most interesting portions seemed to us those which dealt with the general principles of our art, and applied them in a more or less detailed criticism of local buildings. These portions are not only sensible and instructive, but especially worth preserving as giving a lively picture both of the state of the builders' art in America forty years ago, and of the state of the popular intelligence with regard to it. Whatever mistakes and shortcomings we may lament to-day, we shall find that there has been much improvement since Mr. Gilman spoke, both inside the profession and outside of it. All these passages have been gathered together from the twelve lectures, and arranged in an order as nearly logical as possible. It was not possible, however, to make them thoroughly consecutive, without interpolations or alterations of the text; and both these measures have been studiously avoided. When these portions of the MS. shall have been concluded, we hope to supplement them with various extracts of different subjects, given simply as fragments without attempt at sequence or connection.

It will scarcely be denied that architecture is the oldest and the most impressive of all the fine arts, while at the same time its rules are more frequently violated in practice than those of any other — and in no civilized country are they less regarded than in our own. Yet, when viewed aright, it is a subject of great public importance; it has even been assigned, by ingenious writers, to a prominent place among those causes which affect the character of an age, and exert a visible influence over the moral and intellectual habits of a people. A general understanding of its leading principles, therefore, is certainly a desirable object, and one which it will be my present aim, so far as possible, to effect.

The position of this art is certainly a peculiar one. In many respects it differs very essentially from the rest, and it is beyond question that less attention has hitherto been paid to it than to any other. It has been complained — and not without reason — that the equivocal character which it holds, and which is occasioned by its compound nature as a mechanical trade and a fine art, is attended with disadvantages to its professors and to the public, from which the other liberal arts are fortunately exempt. In one respect, indeed, it appears to have circumstances in its favor, which *they* do not enjoy. For whatever may happen to be the state of the public taste, and however great may be the general apathy towards architecture, for its more elegant and intellectual qualities, it is certain that buildings of some kind or other must still be erected, as occasion for them arises; and so far as this, it is independent, it is true, of that sympathy or concern for it which is requisite for almost the very existence of the other fine arts. The shelter and convenience of *buildings* are absolutely indispensable to a state of civilized life; while the elegant luxuries of painting and sculpture cannot in reality be said to be so. Were this view of the case, however, to be carried to the extreme, the claims and pretensions of architecture to the rank it now holds would be virtually abandoned, and it would sink at once to the level of a mere trade. Use and convenience would become its only aim, and the labors and experience of ages would at once be lost to the world.

There is another evil of no small magnitude in the condition of this art; it is one directly opposed to that kind of reform which would advance the spread of good taste by removing at the same time all traces of a former bad one. I refer to the necessary *durability* of even its worst examples. However miserable or unworthy they may be, buildings when once erected *must remain* for an indefinite period of time; criticism cannot annihilate them, nor common-sense topple them down to the dust. They cannot be put out of sight like worthless pictures; they cannot be converted into waste paper like useless books. A feeble and affected school of literature, though ever so much admired by one generation, may suddenly pass away, and be known to the next only as a byword of contempt and reproach. But abortions in brick and stone are not so easily got rid of; the building remains, and must remain an eyesore to every passer-by, — the laughing-stock of this age, and the wonder and contempt of future times. The mischief is done, and it is too late to repair it. Neither do buildings, like books, admit of after-revisals, and of new editions with corrections; unless amended before their completion, the faults and mistakes that may have been committed are altogether past remedy; bad as they may be, they must stand as our bequest to our successors. In view of this fact, declares the acute Dr. McCulloch, "the public at large has a claim over the architecture of a country. It is common property, inasmuch as it involves the national taste and character, and no man has a *right* to pass himself and his own barbarous inventions as a *national taste;* nor to hand down to posterity his own ignorance and disgrace, to be a satire and libel on the knowledge and taste of his age."

The productions of architecture cannot, on the other hand, like those of the other fine arts be multiplied at will. They cannot be produced indefinitely, and so as to meet the demands of mere taste; but only in proportion to the actual necessity which arises for them. But with painting and sculpture, the reverse of this is the case, since they can be encouraged for their own sakes alone, and are exempt from that check upon supply which limits it according to the positive wants of their patrons. Hence, architecture is much more dependent upon casual circumstances and opportunities than they are; and is placed beyond almost every other kind of control than that which the ordinary course of things can provide. If an opportunity for its encouragement arises in any other way, the art is, even then, only called into action for the sake of ministering to the pride, or perhaps to the mistaken taste of those who can afford to pay for it. It does not always follow that the most lavish expenditure is attended with the most satisfactory results. How far such is actually the case may be judged by looking at what has been done among us, within the last fifty [1800–1844] years. It might be deemed uncourteous to point out at this time any individual examples of failure; but among the buildings erected during that period, we may find many that are certainly far inferior to what they might have been rendered by more diligent study, and more artist-like treatment. Those who have only learned *building* as a *trade*, have been encouraged to practise *architecture* as an *art*, and the encouragement they have met with seems to have been in exact inverse proportion to their merit. In this circumstance alone, we can find the reason for the present condition of the public knowledge and taste. The excuse generally alleged, however, is that the architect has been obliged to pay a greater regard to economy than to anything else; yet we can scarcely allow this to be a reason, because it is plain to every one, that of late years, our most costly edifices, those in fact where no limit has been assigned to the expense, have been the most unsatisfactory of all. And even were we to allow it to *have* any weight, it does not follow that economy should prevent the display of refined taste; because in proportion as there is necessity for being sparing of outlay, there is also necessity for taking care that there shall be no loss of attainable effect. It is, then, more than ever demanded that nothing shall appear to have been aimed at beyond what has been actually done, and that what has been done, should, if possible, appear to be quite as much as ought to have been aimed at, or as the particular subject itself would properly allow. But no effect can be worse than the one so unfortunately prevalent among us, where the utmost ambition of design appears to have waged an ineffectual war with comparative poverty of means. Churches have been erected, whose fronts are decked with the stateliest pomp of heathen magnificence, but whose sides are scarcely more finished than a hovel; and the Choragic monument of Lysicrates, the richest specimen of the Corinthian order, has been laid under contribution to furnish columns for a shingle palace, on the dustiest road in the suburbs of the city. Such ludicrous instances of misapplied ornament remind us of the celebrated costume of the negro King of Congo, who shows himself to his delighted subjects adorned with a cocked hat, an epaulette, and a pair of green spectacles, but almost entirely innocent of clothing upon any other part of his sable body.

To investigate all the reasons for this low state of architectural science would perhaps be a delicate and invidious, rather than a difficult, task. It is on all sides confessed that, owing to some influence or other, architecture has been hindered from putting forth its powers in this country on a scale commensurate with what several of the respective occasions have demanded. If the majority of such unpropitious influences, however, are declared to be of such a nature as to defy all attempts at remedy, I think this yet remains to be proved by those who are interested in throwing the blame entirely upon circumstances. It is not likely that they will be remedied at all without considerable exertion; without very energetic measures of perseverance even, on the part of members of the profession itself. They ought at once to take the lead in the work of reform, and to free themselves from the imputation of culpable mismanagement, or of tame submission to the grossest errors of judgment on the part of their employers.

Until the public have acquired some true perception of architecture as a fine art, and until they have cultivated such feeling for it as will enable them to enjoy it for the sake of the pleasurable sensations it excites in the mind, they will be satisfied with a very low standard of merit on the part of its professors, and evince a carelessness for the beauties of architectural design, without any reference to the enjoyment they might easily derive from their encouragement. It may, perhaps, be thought the bane of *all* art, that it is so dependent upon the public feeling; that it flourishes in proportion, not

only to the degree of talent among its professors, but according to the degree of taste or sensibility for it among other classes of the community. But there can be no doubt that such is the true state of the case. Unless there are minds capable of appreciating them, the immortal designs of Raphael are little more than so much old canvas or paper; the sublime sculptures of the Parthenon than so many defaced and battered stones. Without some congenial minds, some kindred faculties in those around him, the artist, let his particular calling be what it may, is forced to breathe in a withering atmosphere; his genius may bud, yet it will be only to be blighted; and however fair may be the creations of his fancy, though they may in themselves be a paradise of art, yet it will be one of which irrational animals only are the spectators.

All art demands more or less of acquired taste; and in the case of architecture especially is there need of this prerequisite, for the obvious reason that it is not an imitative art, and the signs therefore by which it appeals to the mind must be understood, before it can be made intelligible to the learner. [The author then proceeds to say that the idea of "fitness and adaptation" is the main principle to be borne in mind.] Pure architecture of any style or kind, is governed by rules which are based on a refined analysis of what is suitable in the highest degree to the end proposed. Hence it follows that there should be no parts about a building that are not necessary for *convenience, construction and propriety*, including under the latter term all such features as are expressive of the peculiar sentiment intended to be conveyed. It is necessary to make this distinction, because all architecture is symbolical, and expressive of some meaning or other, and the various forms which have impressed it with such singular differences in various parts of the world have been adopted as each country advanced in civilization and refinement; and may be viewed as transmitting to posterity the degree of importance to which the nations that invented them had respectively attained. Those are, of course, the highest styles, in which this unity of feeling has been most successfully carried out. "In *all* the fine arts," says Mr. Alison, "that composition is the most excellent, in which the different parts most fully unite in the production of one unmingled emotion; and *that* taste the most perfect where this relation of objects in point of expression is most delicate and precise." In art as in nature, beauty seems to follow the adoption of forms suitable to the expression of the end. The fundamental error of imitators in all the arts has its origin in the disregard of this rule; they servilely copy the effects which they see produced, instead of supplying and adopting the principles which guided the original artists in producing them. Thus they disregard all those local, temporary or accidental circumstances upon which the propriety or impropriety — the congruity or incongruity — of their works must wholly depend. Every design may thus at once be tested by a maxim which will invariably be found to be correct. . . .

I will now bring before you two of the best known examples in the Grecian and the Gothic style, and though these are, as you will perceive, so totally different from each other in every feature, it will yet be easy to illustrate the great leading principle of fitness and propriety from both of them.

The Grecian temple, of which the Parthenon is a general type, consists of a colonnade, or exterior range of columns surrounding the whole edifice, and carrying above them the entablature on which the roof mainly depends for support. The cell or enclosed portion of the building is formed by a plain wall behind, into which no windows should ever open; and on this account the small interior was either comparatively dark, or, in those temples called *hypæthral*, lighted only at the top. If this arrangement is departed from in our modern imitations the simplicity and unity of the style is violated, and the incongruous building becomes a miserable departure from the style it professes to follow. But when employed by its authors and inventors the style of Attica and Ionia is nearly faultless. The separate members of the building have a definite relation to the whole. They are connected by their affinity, and united by the position in which they stand. Each one is in its destined place; no one is extraneous or superfluous; but all are characterized by the utmost fitness and propriety. This kind of architecture is a composition of columns which are obviously intended to assemble themselves only in the form in which you see them here. They seek to enter into no other combination. Beauty and elegance result from their present union. The long, unvaried horizontal line of the entablature rests in stable tranquillity upon the even ranging capitals below; and the conical shafts of the columns are repeated in unbroken symmetry: The sacred architecture of Greece requires no habitable interior. The temple was entered only by the priests; while the colonnade and porticos were spacious, for the people who assisted without. It is therefore so constructed that a cell of narrow dimensions, and intended to contain a single statue, is the only apartment which can be placed within its walls. We are not expected to enter into the fane. It is a monument which we are to contemplate from without; and which appears in all its pride when considered as a portion of the surrounding landscape. The chaste columns and pure sculptures, which are now mellowed by the hand of time to a sad and sober gray, or fallen into the ruin in which no doubt you have often seen them represented, originally shone with all the splendor that the taste of Phidias could invent, or the munificence of Pericles could bestow. Every moulding was distinguished by strongly contrasted colors; and the snowy whiteness of the Parian marble was concealed beneath glowing layers of gold, azure, and vermilion. In the opinion of the Grecian architect, his building was seldom more than the framework of his idolatrous sculpture. Every feature about it bespeaks this end. It was never intended for social worship; it was the shrine only, upon which decorations were to be displayed. The altar flamed in the open air before the portico, and the votary was to offer up his sacrifice there, looking around to the woods, the purpled hills, and the circling horizon. . . .

From the science of its mechanical execution, aided by the transcendent skill of the sculptor, the beauties of the *design* in Grecian architecture are doubly enhanced. As *masons*, the Greeks carried the art of building to the highest point of excellence which their method of construction required. The Grecian architect possessed all the means which were necessary to carry out his ideas. The elements of those ideas indeed, were few, for scarcely any variety of structure was demanded from his art; he placed a large number of columns around the more sumptuous edifice, and a smaller number around the more humble structure: he raised the temple and the tomb. His career was definite, he saw the end of it; he was required to perfect rather than to invent; his architecture submits itself to the judgment, and the judgment is satisfied. A problem has been proposed to which a perfect solution has been given. The Grecian architect performed all that he had promised to himself, all that he had wished to have was given him, and so soon did the Grecian style attain its wonderful perfection, that from the earliest to the latest period, a few elegant improvements scarcely to be discerned even by the practised eye, a few tasteful variations rather to be described by the critic than felt by the spectator, are the only tokens which denote the progress of Grecian art from infancy to maturity.

But such were not the labors of the Gothic freemason. He stops frustrated, but not in disappointment. Neither the marble quarries of Mount Pentelicus, nor the chisel of Phidias could assist him. Rude materials, and still ruder hands were all that he could command. His architecture must depend only upon its innate character and significance. His cathedral, therefore, must be considered rather as a forethought than as a finished specimen. It exhibits the effort that has been made to embody those abstract ideas of solemnity and grandeur, which could not be fully realized or accomplished by human power. Still the effect has not failed. Gothic architecture appeals to the imagination, and fancy half supplies the deficiencies of the material scene. A Gothic building has always the charms of mystery: it always appears to be larger than its actual dimensions. The mouldings, the pillars, the arches always create receding shadows, and to the mind the idea of space arises, it will be found, from a succession of shadows, just as the conception of time results from the succession of ideas. In the earlier Gothic periods the management of light and shade was studied with remarkable skill. The mouldings are all composed of deep hollows and bold projections; the curves are almost invariably of the higher order, and the separations of the apertures are marked by carrying the mouldings above the level of the wall. A small fillet, also, often runs down the front of the lesser columns. By these artifices, all the forms of the building are brought out, painted as it were in bold relief; for the minute linear projections catch the light and heighten it, and the undercutting deepens and mellows the shade. In the later and more luxuriant styles, however, this attention to the tints was neglected, and the mouldings occasionally became shallow and trivial. But the daylight is courted by the Gothic architect, throughout all the periods of his style. The lines and masses of the roofs and buttresses, the ascending towers, and pinnacles, and spires are all marked and defined by the full blaze of noon, which falls upon them, and contrasts itself with the freshness of the apertures and the darkness of the walls which are behind the sunshine. After we have passed the outer gate, the architect seeks to exclude us from the sight of middle earth. His monastic genius delights in quadrangles, cloisters, and solemn porches in majestic piles, which expand and close round the spectator, leaving him nought to contemplate but themselves, and the clouds above him, toward which their tapering lines insensibly conduct his eye.

Thus it is that the Gothic style always fills the mind, and conveys the notion of comprehension and capacity. Habitation, and converse and congregational worship are seen to be its only intent. We seem to be invited to enter the cathedral. The wide portals expand upon the western front, and in the long perspective which appears between the pillars of the porch, and ends in the distant chancel, the light darts downward from the lofty unseen windows high up in the walls; each one marked by its slanting, colored beam of luminous haze, checkering the pillars and the pavement, and forming what has been beautifully called "a solemn translucent gloom." Gothic architecture may be viewed as an organic whole, bearing within it a living, vegetating germ. Its parts and lines are interwoven and united, they spring and grow out of each other. Its essence, its distinguishing idea is the curve, which in the physical world is the token of life or organized matter, just as the straight line indicates death or unorganized matter. It is a combination of curves and arches, whose circles may be infinitely folded, multiplied, and embraced. Hence, the parts of a Gothic building may be expanded indefinitely, without destroying its unity. However multiplied and combined, they still retain their relative bearing; however repeated they never encumber each other. All the arched openings, the tall pointed windows, the recessed doorways are essential parts; they do not pierce the walls of the structure to weaken them; on the contrary, they bind them together. The spire may rise aloft, the large and

massy walls may lengthen along the soil; but still the building preserves its consistency. Richness of decoration, color and gold, may increase the effect of the Gothic style; but the inventor chiefly relies upon his art and science. Gravitation which could bring the vaulted roof to the ground, is the power which fixes each stone in the arch, and every one bears witness to the mastery which the architect has gained. Sir Christopher Wren is said to have gone down to Cambridge at least once a year, to contemplate the vaulted ceiling of the chapel of King's College there; and although the first mathematician and architect of his age, he repeatedly observed that he should not know where to fix the first stone of such a stupendous structure. The details of a Gothic building are frequently inelegant. Parts considered by themselves are often destitute of beauty, but they are always relevant, and all their minor faults are lost in the merits of the whole. . . .

The traditions of the Greeks, embodied with their religion and poetry, built the substructure on which the foundation of Grecian art was raised. Whether this sentiment afterwards found expression in the dramas of Æschylus or Euripides, or in the lyrics of Pindar and Anacreon; whether it found a tangible shape and form in the works of Phidias and Praxiteles, or was presented to the eye in the colors of Polygnotus or Zeuxis; all these were but different modes of the same feeling, the result of a sincere and earnest adoration of what was great and beautiful in art. The form once given, it required but time to complete the superstructure that at length arose.

It might never indeed have attained its glorious perfection had not other circumstances combined to add to its beauty. If Salamis and Platæa had never witnessed those triumphs of patriotism, the mind of Greece might never have risen to that exalted pitch, which impressed so noble a stamp on all her after acts. Her poetry and her arts, as the voices through which her sentiments of freedom and glory found an utterance, would never have acquired that power and purity, which is the essence of all the productions of those young days; whether we have it now in the works of her poets, her painters, her sculptors, or her architects.

It was a similar expression of national feeling and of national religion, which produced the architecture and the arts of the Middle Ages. The splendid remains of Winchester and Ely, of York, Salisbury, and Oxford, are nothing more than the reflex and expression of the poetry and the faith of the people. They were written in a language which all were interested in, and which was understood and felt by all. And the observation is certainly true, that in the arts of a country its history is written, and that they are much more faithful interpreters of it than the chronology of its kings. In them, the nation speaks for itself without constraint, and they have studied the philosophy of art to little purpose, who expect that circumstances and causes so widely different from any we have now reviewed, as those that at present exist in this country, can possibly reproduce what other causes produced in other times.

I am not unaware of the objections that may be urged against the views I have now stated. As similar causes in the physical world always produce similar effects, it may appear to many very reasonable to suppose that the form of a beautiful specimen of architecture, which has afforded a pleasurable sensation to the spectator, will always retain that power. An exact copy of a pleasing original when repeated or created anew, may be anticipated to produce the same degree of gratification as it did in its original place. But when the architect acts upon these premises he will be sadly disappointed. The slight consideration which we have now given to the nature of his art, has I think shown us that it is to produce its effect upon the *mind* quite as much as upon the eye. Its forms are understood by the intellect; not merely painted upon the retina. The pleasures which it excites arise from complicated sources; they spring from the thoughts which we bestow upon the object, and not merely from the contemplation of the form. This assertion may be easily exemplified. A building which we *know* to be constructed of pine boards and composition ornaments; of hollow columns glued together in pieces; of cast-iron balustrades, and copper spouts; will never please as much as if it were raised of freestone. The outlines of the design may have the same elegance; but we cannot disjoin the ideas of grandeur and durability, and the notion of the instability and slightness of the flimsy edifice derogates from its consequence. Besides which, when we look at a building we are gratified by considering the labor and skill of its construction. We like to see the firm and regular courses of well-squared stone; the shaft compacted with the capital, and the wedge-stones balancing each other in the arch. But when the materials pretend to perform a part which does not belong to their nature we are offended by the deception, and receive but a very small proportion of the pleasure which their *forms* would have given if executed in the genuine substance. Every deception of this kind in architecture becomes a blemish which the mind does not pardon. The rough wall and oaken rafter of antiquity (observes Mr. Pugin), yet impress the mind with feelings of reverent awe which never could be produced by the cement and plaster imitations of elaborate ornament, and the florid designs which in these times are stuck about our mimic buildings in such disgusting profusion.

Every structure raised by the hand of man derives its entire value as a work of art from the feelings of the human soul. It is not to be viewed as a mere pile of stones, neatly joined together and symmetrically disposed in regular courses; but as the expression of a sentiment and the exponent of a real motive and meaning. The dwelling derives its sanctity from the domestic hearth; the palace from the throne; and the church from the altar which it contains. If this truth be not kept in view by the architect, instead of catching the spirit and meaning he merely reproduces the forms and details of the works of his predecessors. His compositions are senseless, inanimate, and rigid; mere unmeaning form, without one particle of life-giving spirit, and conveying no possible sentiment or emotion to the mind.

Not in this manner worked the great architects of antiquity. With them it was not a blindly imitative, but an inventive and an intellectual art. They did not linger in idle contemplation of their predecessors. No style or structure was held up as a perfect model, or propounded as an infallible test. It was their desire to excel by the mixed exercise of judgment and invention. Selecting from the skill of past ages the ideas best suited to the present, they felt it was their calling to adapt their art to the wants and feelings of the society in which they lived. It was thus that their structures acquired the charm that we would vainly attempt to impart to cold and corpse-like restorations. Those who seek to distinguish themselves by the practice of this, which has been termed the finest of the fine arts, should not, indeed, be content to lose the benefit derived from study and experience. But they may be best instructed how to profit by the contemplation of past excellence by considering (in the words of the Earl of Elgin) that their models should be imitated, "not with the timid and servile hand of a copyist; but their beauties should be transferred to our soil, preserving at the same time a due regard to the changes of customs and manners, to the difference of climate, and to the condition of modern society. In this case it would not be so much the details of the edifice itself, however perfect, which ought to engross the attention of the artist; but he should strive rather to possess himself of the spirit and genius by which it was originally planned and directed; and to acquire those just principles of taste which are capable of general application." The whole course of an architect's necessary studies could not be better set forth than in this admirable quotation. It is a matter of much greater doubt how many will condescend to improve themselves by complying with such judicious and wholesome advice. It is a balance by which but few could be tried, and not be found wanting.

From the observance then, of this great principle of fitness and propriety results that unity of style, which is always so highly commended by the best writers. Where a definite end is proposed and is strictly kept in view, it follows that all minor considerations will be held subservient to it; and that every feature of the detail will be made to harmonize with its requirements. Incongruity and contradiction must otherwise be the sure result. The unity of the whole, and the obvious connection of the various parts are words which comprise almost everything in the application of the principles of criticism to architecture.

But how seldom have any of our architects exhibited an acquaintance with these simple and obvious principles. They have fancied on the other hand that by copying the outline, and reproducing the porticos of Grecian temples, they were really reviving Grecian art; and that by persevering in this course they might produce works as beautiful as those of the ancients. Some have even expressed the hope that by adding our knowledge to theirs, and the power of our civilization to the less refined polity of those early times, we may surpass them. But those who reason in this way, says a late writer, appear to have only glanced at the surface of the question, and to know but little of Grecian art, or of what in fact it really consisted. It was not with those artists a thing borrowed from others, or something apart from their feeling or polity; but really and wholly the enthusiastic expression of the faith, the feeling, and the poetry of the nation.

The real architect then, ought not to work merely by line and rule. He should recollect that he is composing a work which ought to have a given intent. Whenever he determines to adopt any system which prevents him from yielding to the *meaning* of his structure, he ought to apprehend that he is in the wrong. Whenever he feels himself *cramped* by his pattern, he may be assured that the precedent, however good in itself, is *bad* for the purpose to which he makes it a slave. Take the Parthenon, so exquisite in its purpose and meaning; convert it into a dwelling-house by building your external walls in the place of the pillars; raise the pitch of its roof to suit our wintry climate; fill the shell with two or three tiers of glazed windows; cover the roof with numerous stacks of vainly disguised chimneys, and then see if these homely and unpretending features will not entirely overcome the ostentatious display by which they are surrounded.

NUISANCE — INCONVENIENT BUILDING. — A bill in equity was filed by certain property owners praying that a building in a highway pertaining to their property be removed, and that the closing up of the highway be enjoined. There was nothing about the building itself deleterious to the health of the complainants, or that rendered the use of their habitations uncomfortable and dangerous—it was simply inconvenient to have the building occupy the street. In this case — Clark *vs.* Donaldson — the Supreme Court of Illinois decided that an injunction could not be granted. Judge Schofield, in the opinion, said: "The building having been erected, a court of equity would not, except in an extreme case, interfere to remove the building. If it were a building dangerous to property or life before a jury could hear and decide upon a case, the court might act. But if it is only, as it is in this case, an inconvenience, no matter how great, a court of equity would have no right to interfere and abate the nuisance, at any rate before the question is settled at law."—*Iron Age.*

VITERBO.

IT was night when we entered Viterbo, and our reception was characterized by an attitude of reserve which a further acquaintance materially modified. The broad, low *vettura* slowly climbed a hill in quite the usual manner — a manner acquired by the necessity of always climbing a hill before entering an Etruscan town — and as we neared the summit, a long line of dark walls rose gradually skywards. A fitful light, stooping in the wind, made weird shadows across the face of a Madonna above the gate, and a form, surmounted by the single cock's feather that denoted an officer in the Octroi service, challenged us from under the archway, and let us pass without further ceremony. Within the gates the road inclined downwards towards the centre of the town. It was perfectly deserted; high masses of houses upon either side were grim and dark; here and there, as we searched for an *albergo* amidst a little labyrinth of narrow streets, a flaming lamp threw broad, grotesque shadows upward from cornices and mouldings; but usually the sky, dark as it was, seemed light in contrast to the granite walls about us. At last we rattled over the stones of a small, shapeless *piazza*, and disembarked at the door of the Albergo Angelo. The usual commands ensued, followed by the inevitable response, "*Subito, subito*," and the equally inevitable delay. But at length Viterbo faded away like all other things of consciousness, to be seen under more favorable conditions in the morning.

The Viterbo people pride themselves not a little upon the fact that their town has been called the Nuremberg of Italy, and as far as the proportions of the buildings are concerned, they can justly do so. Built largely by feudal lords in the thirteenth century, at a time when houses were literally castles, the very strength necessary in their construction gave these houses a breadth and dignity which is largely lacking in the German work. Whoever, loving the quaintness of the Rhineland, and attracted by this pseudonym, should make a pilgrimage to Viterbo, in search of droll conceits or grotesque bits, would be liable to disappointment; but if, like Doctor Syntax, his search were for picturesqueness *per se*, there is sufficient for his ample satisfaction. The peculiar virtues of Viterbo work are its originality and its simplicity. It is distinctly individual in that nowhere else in Italy or Spain is this peculiar kind of exterior staircase used — an exterior staircase [*See Illustrations*] parallel with the façade, terminating in a broad landing, which is closed from the stair by a stone-trimmed door, and is carried by a half-arch. There is a similar landing in a house at Brindisi, but its approach is different. In Spain, the little gallery over the small north court of the Ayontamiento, in Barcelona, approaches it the most nearly; but this is only a balcony, to which access is gained from the interior. The reason for such staircases is doubtful; mere picturesqueness would hardly seem to have justified it in the minds of the designers of that age. Lack of sufficient space for broad stairs, a desire to save all room inside and a consequent hanging of the stairs in mid-air to allow access to both stories, at once suggest themselves; but from the position of some of these buildings upon piazzas with ample space about them, these are manifestly not the reasons. The strong and solid (never balustered) parapet to the landing, and the strong door between it and the stairs, seem to imply that the landing was available as both an offensive and defensive sort of barbican to the house. This is further supported by the fact that the two stories are not otherwise connected; naturally all this is mere surmise. The broad surfaces of the Viterbo work cannot be too highly praised; they even occur in the construction of the arches, which have much longer voussoirs than would be necessitated by mere constructive requirements. It is one of the hairs of architectural controversy that is frequently split, whether the face surfaces of arches shall be broader than absolutely necessary. As a matter of fact, there are few arches but must irritate the "purists." As well object to a label moulding for having no *raison d'être*. The Viterbo arches, by the way, have labels. The inner and outer circumferences of the voussoirs are not struck from the same centre; the outer line of the arch is more or less stilted, making the key longer than the voussoirs, which gradually decrease in length towards the springing of the arch. This, of course, is not at all unusual in Italian work; occasionally the outer arch line becomes a slightly pointed arch, as in Or' San Michele, at Florence.

In Avila, Valladolid and Salamanca, in Spain, there are arches which resemble those in Viterbo, though, while in Italy the tooling of the face of the voussoirs is the same as that of the wall-ashlar, in Spain the voussoirs are without a label, and are slightly — very slightly — more finely cut upon their surfaces, thus obtaining an excellent contrast with the wall, which is flush with the face of the voussoirs. There are other arches which are almost wholly moulded, the mouldings being comparatively simple, consisting of fillets, flat cymas and scotias, kept well to the surface of a plane, as in most good work. Wherever these mouldings are decorated, the design is simple; in fact, the material does not allow fine cutting. Egg-and-dart work is almost entirely absent; flat outlined leaves are largely used, and also a peculiar form of prismatic star pattern. The arches are particularly good in their proportions and the sweep of their lines; many are low and flat, but always have a free curve, decidedly different from the weak, broken-backed line of the so-called three-centred arches.

The Via del Pelegrino, which wanders about the town in a desultory fashion, passing beneath arches and across bridges, culminating in the little piazza so often sketched, is full of picturesque bits. The very manner in which the old *torroni* still existing mass accidentally with long, low roofs or arcades carried upon baseless, sturdy columns, often suggests a scheme for a façade, or a grouping of parts that is excellent. To state that Viterbo is termed by ancient writers (usually nameless) the city of "handsome fountains and beautiful women" is but to reiterate a very hackneyed sentence of the guide-books. The fountains only demand our attention, for the charm of dark eyes, as potent still as in the days of La Bella Galiana, needs a finer medium than prose to be its worthy exponent. In the centre of each little square is a polygonal basin of stone, simply panelled, with the scutcheon of some old family in low relief upon its sides, surrounding a columnar shaft circled by a few grim lion-heads, from whose yawning mouths the water falls in long curves. Crowning the shafts is a quaintly-cut Madonna, or an opening flower. No attempt is made to make the fall of the water itself effective; the thin jets fill the great basin, and scarcely ripple the surface as they fall, and the water lies cool and dark to the basin's lip, with only sufficient movement to cause the light reflections, that lie in concentric waves about the column's base, to slowly undulate. Here and there the lion of Viterbo, either in relief or standing firmly upon his four sturdy legs, ornaments a more ambitious design. One of the later fountains, ascribed to Vignola (though superior to most of his work) is a peculiar but effective combination of forms. The Fontane Grande is already well known and requires no description, and the court of the Palazzo Publico contains a late fountain that is rather Barocco.

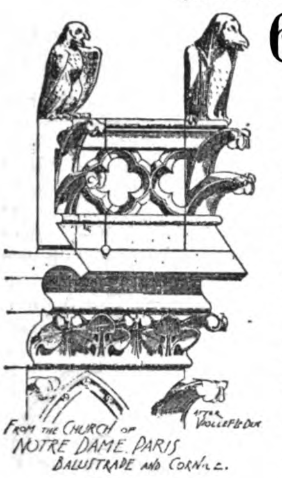
The churches have little to recommend them, excepting Santa Maria della Verita, outside the walls, which has a Sposalizio, by Lorenzo di Giacomo (1469), which is one of the finest frescoes in Etruria, and a very charming Gothic cloister, of which the proportions and tracery are equally good. The interior of the cathedral is simple and good. The historical interest of Viterbo centres about the piazza in front of the cathedral. Here, in 1155, Frederick I, with much pomp, and surrounded by richly costumed followers, came to render himself vassal to Breakspeare, the English Pope Hadrian IV, and held his stirrup as he mounted; here the place was thronged, in 1279, as the rumor spread through the town that Count Guido, to revenge his father's death at Evesham, had slain the nephew of Henry III of England at the high altar; and here, in the old Episcopal Palace, whose front is now more scarred than attractive, three of the Popes of the thirteenth century owed their short and stormy supremacies to the vote of a conclave whose every member trembled at the word of Charles of Anjou. A fine façade the old palace must have had. The entire court on the right, which is carried upon stone vaulting, was separated from the piazza by a doubled columned screen, surmounted by a Ghibellini parapet, with escutcheons. This, now badly mutilated, is filled in and forms a screen wall. In the court behind is one of the best fountains in Viterbo — a many-sided polygonal basin, around a column of ample diameter, which carries above its leaved cap another decagonal basin ornamented with waving flutings and lions' heads; a single jet rises from the centre of the upper basin. The water no longer flows; bladed leaves and purple flowers of the iris sway in the wind instead, while the seats around the court, where the bishops sat in the afternoon shadows and discussed the famous muscatel, which proved too much for old Johannes von Augsberg, are disused and empty. The great Hall of the Conclave can only boast the remains of its ceiling. Passing out from it, and down the broad steps, a quaint street at the left leads to the square near the Palazzo Publico, where there is a pathetic little museum of Etruscan and Roman antiquities, but few of which are intrinsically interesting after one has seen the Etruscan museum of the Vatican and that at Corneto. The private collection of Signor Falciore, which is near at hand, contains, on the contrary, some of the finest Etruscan glass and gold work to be seen in Etruria; the decorative dainty designs of the gold-work especially are extremely interesting, even to an architect, such design being capable of adaptation in many ways. The Etruscan tombs at Corneto, some thirty miles away, are naturally of much more interest to the archæologist than to the architect, but the color of the wall painting is well worth studying. At the corners of the palaces that flank the piazza of the Palazzo Publico at Viterbo, stand two columns on either side; around them and above, upon the palace walls, are richly cut, ribboned escutcheons, with many a tasseled cardinal's hat and not a few Papal tiaras, relics of a splendor that vanished centuries ago. The columns flower into bell-shaped caps, each of which carries a long, flat base, upon which, with all four feet planted firmly, stands the lion of Viterbo. He stood there with the same conscious security in his bearing when the people went out to battle against Rome, and came home triumphant; he still stands, a symbol of the indomitable spirit that inspired and continues to inspire these cities of Etruria. As we pass out under the high arches of the gate, into the open country, along one of those many roads all of which "lead to Rome," of the many things left behind us in the quiet city that he guards, his attitude of defiance leaves the strongest impression of all upon the mind.

C. Howard Walker.

THE ILLUSTRATIONS.

THE STATUE OF THE REPUBLIC, PARIS, FRANCE.

[From *La Semaine des Constructeurs.*]



ON the 14th of July, the day of the National Fête, the Statue of the Republic was unveiled on what was formerly known as the Place du Château d'Eau, Paris. This monument is the work of M. Leopold Morice, sculptor, and M. Charles Morice, architect. The statue is of bronze, the body measuring six metres and a half; the head from the top of the forehead to the chin is one metre, and the Phrygian cap which crowns the whole measures 1m. 40c., while the weight of the statue is about 10,000 kilogrammes. It is placed on a circular granite pedestal, and the three statues which form part of the group, and symbolize the republican device, "Liberty, Equality and Fraternity," are also of granite. Near the cap of the pedestal is the coat-of-arms of the city of Paris, in bronze. The statue faces the Rue Turbigo, and on this side on the podium, one metre above the ground, is a lion four metres high, who seems to hold himself in readiness to protect the urn of universal suffrage. A little behind him is a large shield planted in the midst of large palm branches, bearing the date 1789, all in bronze. Twelve bas-reliefs, recalling the great achievements of the national history, are to ornament the pedestal. Six of them are already finished; they are the oath in the tennis-court, the taking of the Bastille, the *abandon des privilèges*, the provisional Government of 1848, the 4th of September, 1870, and the fête day of the Republic in 1880. The illustration also shows one of the decorative standards for which M. Mayeux obtained the first prize in the competition for the decoration of the Place de la Republique.

MANTELPIECE IN THE FLEMISH RENAISSANCE STYLE FROM THE ROYAL PAVILION AT THE FISHERIES EXHIBITION, LONDON.

[From *The Cabinet-Maker and Art-Furnisher.*]

THE principal feature of this vestibule, and the one to which I wish to direct particular attention, is the characteristic mantel which I have roughly sketched upon the next page. It is essentially Flemish in its constructive features, and well represents that particular phase of the Renaissance which was cultivated both in Flanders, and, more crudely, in England, in the time when the artificers of Northern Europe commenced to catch the spirit of their predecessors of the sunny South. It forcibly reminds me of a mantel which I saw in the Musée Plantin-Moretus, at Antwerp, and it is of precisely the class of work which might have been seen in the house of a Flemish patrician of the seventeenth century. Although the same kind of work was executed in this country at about the same period, our designers did not effect the "hooded" mantelpiece so much as the Flemings. I think this is to be regretted, especially in the case of our halls, because the building out of the wood-work gives such a capital opportunity for the display of curios and pottery above. This capability for such decoration is specially manifest in the present instance, and Messrs. Gillow have fully availed themselves of the chance afforded. What with armor provided by Mr. J. E. Gardner, and bric-à-brac from the stores of Messrs. Daniell & Sons, of Wigmore Street, the hood of the mantel groans, so to speak, with a weight of glistening treasure. The richly-chased and inlaid musket, and the brilliant colors of the late Italian bronzes and majolica stand out well against the deep tone of the velvet-covered background.

HATCHETT'S HOTEL AND WHITE HORSE CELLARS.

[From the *Building News.*]

IN rebuilding this hotel on the site of the well-known hostelry in Piccadilly, for the Hatchett's Hotel Company, Limited, a portion of the ground-floor has been reserved for a restaurant, etc., whilst in the basement, the far-famed name of "The White Horse Cellars" will be perpetuated on the old ground, but with improved surroundings, and with increased accommodation for the coaching business. The entrance to the hotel is, as heretofore, on Dover Street, with the coffee and reception rooms on the ground-floor, and the public and private dining-rooms on the first floor. The remaining floors are devoted to sitting and bed rooms, the kitchens, etc., being upon the fourth floor. The architects are Messrs. W. S. Weatherley and F. E. Johnson.

SEMI-DETACHED VILLAS. BY T. E. COLCUTT.

[From the *British Architect.*]

NEITHER of Mr. Colcutt's contributions to the present Royal Academy Exhibition is so representative of his special power and skill in design as are the three pairs of villas we illustrate this week. There is an excellent combination of picturesqueness and freedom with architectural rigidity and dignity in this work, which entitles it to be regarded as a happy illustration of villa design. We do not think it is free from a suspicion of "dodginess," or affectation, in parts, but we speak of the design as a whole. Our readers will observe that the houses are just of the kind which may be successfully produced in brick and terra-cotta, and they will find them to be a favorable example of good terra-cotta work. The houses really illustrate much of the practical knowledge of the late Mr. George Jennings, the well-known sanitary engineer, by whom they were built. The terra-cotta was manufactured by him at his works, Parkstone, Dorset, where the clay used is raised from pits on the estate — the most suitable veins for terra-cotta being alone used, and none other. The color of it varies from a delicate cream to a warm buff. These high-class villa residences are situate in Nightingale Lane, between Clapham and Wandsworth Commons, from the designs of Mr. Colcutt, and under the close personal supervision of Mr. Jennings, regardless of cost. The warming, ventilation, and sanitary arrangements generally are on good principles, and on systems introduced by Mr. Jennings.

THE MUSEUM OF COMPARATIVE SCULPTURE AT THE TROCADERO, PARIS. SKETCHED BY M. H. TOUSSAINT.

[From *The Builder.*]

SANTA MARIA DELLA SALUTE, VENICE.

[From *L'Art.*]

SKETCHES AT VITERBO, ITALY. BY MR. C. HOWARD WALKER, ARCHITECT, BOSTON, MASS.

FOR description, see article elsewhere in this issue.

COMPETITIVE DESIGNS FOR A MECHANIC'S COTTAGE SUBMITTED BY "*Vulcan*" AND "*Euchre.*"

"'*Vulcan.*' Too late for competition. Plan rather crowded at the entrance, and staircase cuts into the lower room over the fireplace, although the view up the stairs from the hall might be pretty. Chimney not well placed for the chambers. The exterior very carefully drawn, but not with the touch of a person who is used to sketching. The grouping is pleasing. There ought to have been an allowance in the full specification for flashing a large cricket behind the chimney that blocks the valley.

"'*Euchre.*' Stairway poorly arranged; central chimney good. Details nicely drawn and perspective prettily rendered."— *Extracts from Jury's Report.*

THE COMPETITION FOR A MECHANIC'S HOUSE. — VI.

DESIGN SUBMITTED BY "*Vulcan.*"

THE house has no cellar. The ground floor is double, with a 2" layer of mineral wool between the joists.

There is no plumbing. An earth-closet is provided, and it is assumed that the liquid waste can be successfully disposed of through a filter-barrel. A dumb-waiter is provided for the conveyance of the chamber-slops (giving freedom in the location of the stairs) and of the daily water-supply. In it, the latter may stand "on draught" in a suitable keg.

The large open fireplace stands for the heating-apparatus. It may be omitted, and its cost used to provide other preferred apparatus.

The house has 2" x 10" floor-joists throughout, 2" x 4" studs (excepting upstairs partitions, which are 2" x 3"), 2" x 6" rafters, etc.

The plaster is two-coat work.

The windows and door-frames are of the simplest description.

QUANTITIES AND PRICES RULING AT NEW YORK.

Earth excavation, 35 cu. yds., @ 30 c.	$ 10.50
Rubble masonry, including outside chimney, 27 perches, @ $4	108.00
Bricks (laid), including fireplace, 3.3 M., @ $20	66.06
Plastering, 360 sq. yds., @ 30 c.	108.00
Total	$292.50
Spruce framing timber, 4½ M., @ $20	$90.00
Rough hemlock sheathing and flooring, 4.1 M., @ $18	73.80
Pine flooring, 1270 sq. ft., @ 4 c.	50.80
Clapboards, 950 " @ 3 c.	28.50
Shingles, 21 M., @ $4	84.00
Paper, 2,000 sq. ft., @ ½ c.	10.00
Mineral wool, 5 squares (2" thick), @ $5	25.00
Doors (including hardware, frames, etc.), 14, @ $7 (average)	98.00
Two 3' 0" x 6' 9" x 1¾"	
Two 3' 0" x 6' 9" x 1½"	
Five 2' 8" x 6' 8" x 1½"	
Three 2' 6" x 6' 8" x 1¼"	
Two 2' 0" x 6' 8" x 1¼"	
Windows, double-hung (including frames, weights, etc.), 12, @ $6.50 (av.)	78.00
Window casements (including frames, butts, latches, etc.), 11, @ $4 (av.)	44.00
Nails	15.00
Dumb-waiter, complete	20.00
Gutters, 50 ft., @ 15 c.	7.50
Leaders, 36 ft., @ 20 c.	7.20
Mouldings, trimmings, turned post for porch, and panel over chimney	20.00
Interior shelves and hooks	10.00
Seat and shelf in porch	7.00
Stairs, complete	30.00
Earth-closet	30.00
Sink	3.00
Labor not included in above (590 sq. ft., not including porch and shed)	300.00
Painting	100.00
Total	$1,131.80
Mason-work as above	$ 292.50
Total	$1,424.30
Builder's profit, 10 %	142.43
Total	$1,566.73

The above is "*Vulcan's*" estimate, at what appear to him liberal rates. Figures for each item, however, furnished by Mr. S. Francis Quick, builder, of Yonkers, New York, give, "*Vulcan*" regrets to say, $1,675. $60 would be saved n Mr. Quick's estimate by omitting the dumb-waiter and the mineral wool.

THE DESIGN SUBMITTED BY "*Euchre.*"

THE walls up to the grade are to be of stone, and from the grade to floor-beams, of brick.

The frame to be of hemlock and covered with novelty siding up to the cornice line.

The gables and roofs to be shingled.
Shingles on the roof not to be painted.
All floors to be of 1" white-pine.
Plaster, two-coat work.
Mill windows, doors and trimmings.
No blinds to the windows.

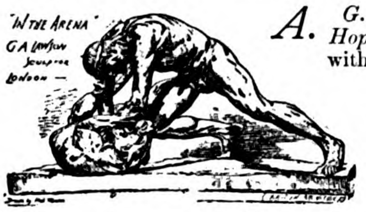
Estimate of Quantities and Prices ruling at Newark, N. J.

MASON-WORK.	
75 yds excavation,	
12 ft. bluestone sills,	
20 perch of stone,	
4600 bricks in walls and chimney,	
370 yds. plaster,	
Total	$493.85
CARPENTER-WORK.	
3550 ft. of timber in the frame, @ $25 per M., put up,	
1600 ft. novelty siding,	
176 ft. shingles in rafters,	
839 ft. shingles in roof,	
556 ft. pine in outside finish,	
110 ft. tongued and grooved roof-boards, for piazza,	
175 shingling lath,	
Total	$225.31
48 ft. half-round gutter,	
17 iron brackets,	
48 ft. 2" leader,	
Total	$19.50
2 mantels.	
4 cellar frames and sashes,	
6 window-frames, 4 lights, 14" x x 28",	
6 " " " 14" x 26",	
4 sashes, 2' 6" x 2',	
Total	$115.00
(All frames to have sashes and casings.)	
2 louvre frames in gables,	
14 doors, 2' 6" x 6' 6" x 1¼",	
1 front door, 2",	
1138 ft. flooring,	
274 ft. baseboard,	
Total	$104.33
(All doors to have jambs and trimmings.)	
Hardware	$12.07
Stairs	15.00
Painting	75.00
Carpenter labor	300.00
Sink in kitchen supplied with water from the street main	45.00
Cesspool in the yard and sink-waste connected	50.00
Architect's commission	75.00
Total	$1,510.05

Estimate by James Cadmus, builder, Washington Street, Newark, N. J.

Asphalt Deposits in Mexico.—A variety of bituminous substances, from the pure hard asphaltum to the fluid petroleum, are known to exist in immense quantities along the coast of the Gulf of Mexico, chiefly in the States of Tamaulipas, Vera Cruz, and Tabasco, but there appears to have been no organized efforts to utilize the deposits either for domestic purposes or for commerce. Consul Cassard, of Tampico, says that almost inexhaustible beds of asphaltum exist on both banks of the river Thamesi, about sixty miles above that port, being found in a comparatively pure state, and containing only an insignificant proportion of foreign matter, chiefly vegetable, which it gathers while oozing through the sedgy borders of the river. The substance may be gathered with little difficulty, but as the locality is only accessible to boats of light draught, the beds are comparatively neglected. Asphaltum, or *chapopote*, as it is called in Mexico, is frequently found floating in masses on the rivers and lagoons, and is cast up on the beach by the waves all along the Gulf Coast, and especially in the vicinity of Tuxpan and on the Grijalva River in Tabasco. These masses, by the local law of flotsam, are the property of the finder, and are sold at the rate of from eight to nine shillings the hundredweight. In the State of Vera Cruz asphaltum is found in considerable quantities, the principal deposits being in the canton of Jalacingo, in Minatillan, in the canton Ozuluama, where several deposits of petroleum, asphaltum and coal are known to exist in a place called El Chapopctito, in the municipality of Panuco, in Papantla, in Tuxpan, and Tomtoyuca. In Vera Cruz, near the village of Moloacan, a few miles distant from the river of Coatzacoalcos, there is an immense deposit of asphaltum, which at some places is found pure, and at others more or less mingled with rock-salt and saltpetre. According to Dr. Hechler, a German traveller who visited it, the "salt mine," as it is popularly called, is an isolated spur, branching off from the main ridge or cordillera. This mountain is from 1,000 to 1,200 feet in height, and with a base of from three to four miles in extent, of cone shape and cracked by earthquakes. On its slopes are found a number of pits, some cold and still, others seething and bubbling and emitting a stifling odor. These pits appear to have cavernous communication with the internal fires of the mountain, which, as indicated by the external heat and frequent subterranean noises, contain vast masses of material in a state of combustion. The whole adjacent surface consists of asphaltum partly solid and partly liquid, and more or less mixed with rock salt. So extensive are these beds that the supply may be considered inexhaustible. In some places the seething pits eject considerable quantities of asphaltum in a liquid state. Extensive beds are also known to exist in the State of Chiapas, on the upper waters of the Grijalva River, which has its course through the State of Tabasco, and empties into the Mexican Gulf, near Frontera.—*Journal of the Society of Arts.*

WATER-CLOSETS.[1]—XVIII.



A. G. *JENNINGS'S Side-Outlet Hopper.*—The first short hopper with a side outlet was invented in 1852, by A. G. Jennings, of London, in which he claims as novelties "the basin (bowl) and trap combined in one piece of earthenware, so formed that the basin is made to contain a quantity of water. . . . . The escape may be from the face, side, or front. The basin may be of any shape to hold water in the bottom." In 1876 an improvement was made on this closet, for which a patent was issued. He says: "It has been found to have the disadvantage that the water tends to run around and around, instead of passing out in a stream." To remedy this defect, a rib, which is shown in the illustration by a dotted line, was introduced. This rib causes the water to be thrown in a mass toward the outlet, carrying whatever waste matter there was in the bowl with it through the trap. An opening for a vent-pipe, which is not shown in the illustration, is now manufactured in the usual position on the crown of the trap. The water is supplied through a fan instead of a flushing-rim, and it is intended to be connected with a tank.

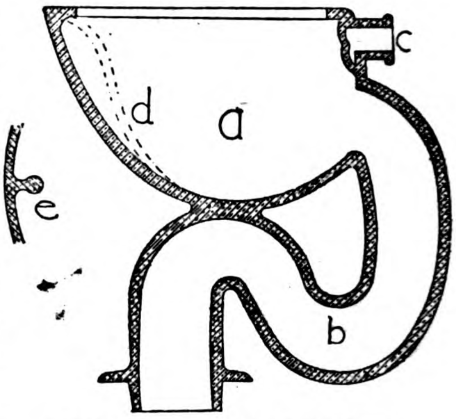


Fig. 190.—Jennings's Side-Outlet Hopper.

a, Bowl. *b*, Trap. *c*, Supply. *d*, Dotted lines showing where rib *e* was added in 1876.

Buckland & Rees's Closet.—The second closet of this class was invented in England in 1862, by Buckland & Rees. This closet has its fan so shaped that a portion or half the water entering the bowl is driven to each side, "instead of being driven with a spiral motion, as is usually the case, the greater part of the water being allowed to flow directly to the bottom of the basin, and thence through the aperture or discharge-pipe on the other side." This closet has its trap and bowl in separate pieces. The "National" side-outlet closet manufactured in this country is apparently a combination of the two closets which have just been described.

Fig. 191.
Buckland & Rees's Hopper-Closet.

a, Bowl. *b*, Trap. *c*, Fan. *f*, Supply.

Hellyer's Side-Outlet Hopper.—I illustrate two forms of short hopper of the type under discussion, which were invented by S. S. Hellyer, of London. He acknowledges that he was unable to make closets of this kind act satisfactorily. The fæcal matter would strike against the sides of the outlet, and leave it in a foul condition. To obviate the tendency which the waste had to remain in the bottom of the bowl, the supply-pipe was divided into two parts, one of which entered the bowl near the bottom, and in this manner forced the water and foreign matter through the outlet. Hellyer concluded that this particular form of hopper was not good for the purpose which it was intended to serve. The bowl is formed so it can be placed in an ordinary trap that is placed above the floor.

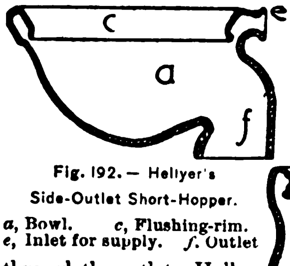


Fig. 192.—Hellyer's Side-Outlet Short-Hopper.

a, Bowl. *c*, Flushing-rim. *e*, Inlet for supply. *f*. Outlet

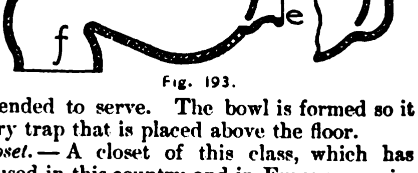


Fig. 193.

Bostel's "Brighton" Closet.—A closet of this class, which has recently been extensively used in this country and in Europe, was invented in 1877, by D. T. Bostel, of Brighton, England. This closet is made in one piece of earthenware, the bowl and trap being formed in a manner similar to the Jennings short hopper (Fig. 190), the difference being in the flushing-rim, inspection-hole, and in the vent-pipe. The supply-pipe is divided so as to enter the flushing-rim at two points. Flowing around the flushing-rim, the water enters the bowl through small holes, which are purposely made larger on the side of the bowl, opposite to, or farthest from the outlet. By this arrangement the greatest volume of water is thrown where it is most needed, and the matter in the bowl is carried into the trap, if not through it.

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[1] Continued from page 76, No. 399.

There is an opening with a cover, to be used for the purpose of inspecting the mouth of the trap, and forming a top to the side outlet. The opening for a vent-pipe is just below the inspection-cover. A vent-pipe in this position will only serve to carry off locally-generated gases, and must never be connected with the soil-pipe, as it would form a communicating duct between the inside sewerage system and the house. In this closet a vent-pipe to prevent siphonage, back pressure, and to carry off gases generated in the soil and other waste pipes, would have to be connected with the branch from the soil-pipe below the floor, as there is no opening for the purpose near the trap. There is sometimes a false bottom or screen manufactured in this closet. I can see no good purpose served by this screen, while it increases the space and surface between the bowl and trap, which is liable to be fouled by matter in its passage to the trap. This closet is arranged to receive its water from a tank.

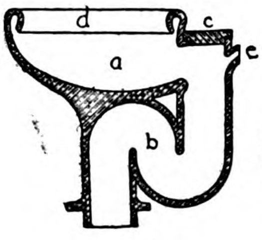

Fig. 194.

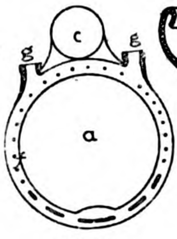

Fig. 195.

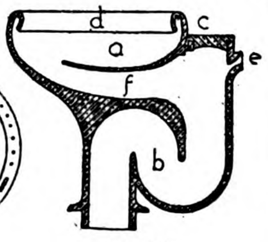

Fig. 196.

The "Brighton" Closet.

a, Bowl. *b*, Trap. *c*, Inspection-cover. *d*, Flushing-rim. *e*, Vent. *f*, Slots in flushing-rim. *g*, Double-supply.

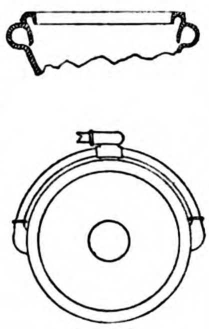

Fig. 197.

Stidder's Branch Supply.

Stidder's Closet. — In 1878, one Stidder invented, and received patents from Great Britain, for a supply-pipe divided so the water could enter the flushing-rim at three points. This flushing device was intended for use with a short-hopper closet.

The Lambeth "Flush-out" Closet. — A closet of this form and class, which was designed and is manufactured by Doulton & Co., of England, is made in two pieces of earthenware. This closet has an inspection-hole so that the compartment over the top of the trap can be examined without difficulty. There is also an opening in the crown of the trap, which may either be used as an inspection-hole or as a place into which a vent-pipe can be inserted. The flushing-rim is similar to the one described in connection with the Lambeth "Trapless" closet (Fig. 60). The openings in the flushing-rim, opposite the side outlet, are so arranged that a large body of water is thrown directly into the bottom of the bowl, and in this manner the bowl and trap are cleaned by the scour of the water. The J. L. Mott Iron Works, of New York, have within the last month introduced a closet of this kind into the market, which has an inspection opening over the side outlet, and a brass coupling in the usual position on the soil-pipe side of the trap, to which a vent-pipe must be soldered or caulked. These closets are furnished in one piece of earthenware, or with an earthenware bowl and an iron trap.

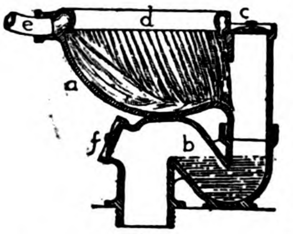

Fig. 198.

The Lambeth "Flush-out" Closet.

a, Bowl. *b*, Trap. *c*, Inspection-cover. *d*, Flushing-rim. *e*, Supply. *f*, Opening for vent.

DEDUCTIONS.

As stated before, *I consider the simple short-hopper closet, with a bottom outlet, the best form of water-closet in use at the present time,* when it is properly flushed from a tank, through a well-arranged flushing-rim, and has a trap properly ventilated. Although I have not found it necessary, a vent-pipe encircling the bowl and connected with a heated flue may sometimes be found advantageous.

In this form of closet we find one simple in its construction, effective in its action, immediately discharging the fæcal matter into the soil-pipe, and at the same time cleanly and healthful, having no concealed chambers or compartments to become foul and generate unwholesome gases. In fact, it leaves little to be desired as an improvement on water-closets. Closets with bottom outlet and of the short-hopper pattern, with effective flushing-rims, are manufactured by the majority of dealers in plumbers' supplies in the United States and Great Britain, and the French have also made an effort to manufacture and introduce them into Paris. The short-hopper closets of the form under consideration are recommended by such prominent authorities on sanitary plumbing as S. S. Hellyer[1] of England, W. P. Buchan[2] of Scotland, and Prof. P. Putyo[3] in a work recently published in Belgium. By a comparison with other forms which are and have been in use, the cleanliness, simplicity and effectiveness of the short hopper can easily be appreciated by those who are least expert on the subject. With the valve-closet we have the bowl and its usually faulty connection with the receiver. The valve itself and its seat, nicely adjusted with all necessary cranks, spindles, journals, springs, levers, weights, etc., according to the pattern of closet, are all liable to get out of order, and all parts which are within the receiver and the sides of the receiver are liable to become foul. Portions of the valve are formed of perishable rubber, the overflow is more or less complicated, and the trap, when one is used, is necessarily placed below the floor, with few exceptions.

The plunger-closet has its plunger, plunger-compartment, and, in all except a very few cases, floats and supply-valves with overflows, all connected with the bowl, and between it and the trap.

In the classes just mentioned, all the described mechanism is used in place of the simple bowl and trap of earthenware. And with what gain? The speedy and effectual removal of waste matter is accomplished more quickly and thoroughly by the simple than by the complex closet. In the plunger and valve closet small particles of filthy matter and foul sediment collect in the compartments which are under the valve or around the plunger, and concealed from view. These particles decay and generate foul and in some instances poisonous gases.

The whole surface of the short hopper, except in the side-outlet form, is visible, and any particles that cling to the bowl are in plain view, and I think all will acknowledge that it is better to have such foulness where it can and will be cleaned off by a careful housekeeper, than to have it out of sight, where it will remain and undergo decay; fair without, but foul within. When these closets (the simple short hopper) have their seats in the proper position, the tank placed at a sufficient height, between seven and eight feet, one-and-a-quarter-inch supply-pipe, which must not be diminished by bends, I have never known them to fail to wash the bowl perfectly whenever flushed. The plunger and valve closets are supposed by many to form a mechanical seal between the bowl and the soil-pipe, but this is not the case with the closets of this class which are in the market, as the overflow only interposes a water-seal, except in the closets mentioned in preceding pages, which is the same seal as the trap of the short hopper. Although the experiments of Dr. Fergus of Glasgow and Doremus[4] of New York have apparently proved that gases in a concentrated form will pass through a water-seal trap, nevertheless I think it can be said without exaggeration, that the majority of sanitarians have accepted the experiments of Dr. Neil Carmichael, of Scotland, which have since been confirmed by Dr. Wernich, as conclusively proving that "water-traps are therefore, for the purpose for which they are employed, that is for the exclusion from the house of injurious substances contained in the soil-pipes, perfectly trustworthy;" in other words, organic germs will not pass through a water-seal trap. [See *American Architect*, Nos. 224 and 236.] With the traps vented and the soil-pipe open, we need have no fear of gases passing through the trap, provided the water-seal remains intact.

The advantage which a short hopper has over a long hopper has been mentioned in connection with the description of the latter type, as having less surface to become foul between the seat and the trap, and the possibility which exists of the trap under the long hopper losing its seal by the impetus attained by the water. The advantage which this form has over the hopper with the side outlet is having the mouth of the trap always visible, and being without the concealed space formed by the side-outlet between the bowl and trap, which should always be avoided. It is needless to say that the pan-closet, as it is usually manufactured, with its container which becomes almost filled with filth, the faulty connection between bowl and container, which allow gases generated to enter the room, its imperfect flush and leaky supply-valves, is not to be compared with the short-hopper closet.

A NEW INTERIOR FINISH FOR FIRE-PROOF BUILDINGS.

Chicago, August 17, 1883.

To the Editors of the American Architect: —

Dear Sirs, — Every architect who has had much to do with fire-proof structures has found the difficulty of devising suitable finish for them. Indeed the "finish" of all commercial buildings is something of a problem.

Wood is not easily cleaned and is readily defaced. Cast-iron is costly, requires painting and is inartistic. Cement (Keene's or others') soon loses its polish by contact with the smoke-laden air. Marble is costly and loses its polish very soon. Encaustic tiles are good, but expensive.

In the construction of a number of office-buildings here, during the last few years, we have found so much difficulty in the above respect, that we have been especially interested in a new device for obviating it.

It consists, in brief, in using thin metal, stamped with a die, and backed with plaster-of-Paris or cement.

The wainscoting is made of tiles of bronze and brass stamped in various patterns and of any size, which have flanges turned back from the face. The wall, whether wood, brick or stone, is covered with plaster-of-Paris to a thickness of about three-fourths of an inch, and the tiles are forced against it.

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[1] *The Plumber and Sanitary Houses.*

[2] *Plumbing.*

[3] *L'Hygiène dans la Construction des Habitations Privées.*

[4] Report of Dr. F. Hamilton's Address before the New York Academy of Medicine. — *Sanitary Engineer*, Vol. V, No. 17

Bases and architraves are made similarly, except that they are drawn through a mould in suitable lengths, and are put up in the same way. In both bases and architraves and in wainscoting, bronze nails, with ornamental heads, are used, rather for effect than absolute necessity; these are driven through the thin metal into the wood grounds.

In many cases very thin metal is used which is reinforced with a backing of common metal. The effect of this work is exceedingly good.

The metal — brass, copper or bronze — is finished in any color from antique brass to deep bronze, or left with the great play of color it has when first from the die. It is evident that the utmost variety of uses can be obtained by this means, and that the result must be, if properly applied, both artistic and enduring.

The cost of the work is not greatly more than if done in wood.

Very respectfully, BURNHAM & ROOT.

PLASTER ON OUTSIDE WALLS.

HARTFORD, CONN., August 13, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Could you inform me through the columns of your valuable paper of the best and most durable material for plastering outside of brick or stone building, or repairing similar work (work to be painted).

Respectfully yours, L.

[PORTLAND cement of the *best quality*, thoroughly mixed with an equal quantity of sharp sand, and perhaps one-fourth as much sawdust. Brush and wash the wall off thoroughly, roughen it by hacking, unless it already presents a good key for the plastering, and have it well dampened with water before applying the plaster. If well done, the mortar will last as long as the brick, and will never come off. Do not paint until the whole is well dried out, which will take two or three months, as the paint will blister if put on over damp work. The very best Rosendale cement may be used in place of Portland, at half the cost, but it is not half as good for the purpose. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

THE RUINS OF CASA GRANDE. — At Casa Grande, Arizona Territory, stages leave Florence and thence run to Pinal and Globe. Casa Grande (meaning large house) derives its name from an extensive ruin a few miles distant to the north. The *casa grande* proper is surrounded by vestiges of still more extensive ruins, indicating the existence in former times of a large city at this point, so large that it is believed to have been the abode of 200,000 or 300,000 people. The *casa grande* was discovered by Coronado in 1540, when in search of the "Seven Cities of Cibola," the "Cities of the Bull." It was then four stories in height, with walls six feet thick. The Pina Indians were then, as now, living in the vicinity, but had no knowledge or tradition even in regard to its origin or history. In 1775 it still covered a space of two hundred feet by four hundred feet wide, as described by Father Pedro Font, who visited it, but it has crumbled rapidly since that time. The ruin is now only two stories in height, and covers a space of only thirty by fifty feet. It is built of a material resembling concrete or grout. The course of a large irrigating canal can still be traced for a distance of forty miles above the whole ruin. Many similar ruins are found in various parts of the Territory, especially among the Gila and Salt Rivers, the Agua Fria and San Pedro, unmistakably pointing to the existence of an advanced ancient civilization in this country, which has been swept entirely from the face of the earth. On the San Pedro are remains which indicate the existence there at some former period of a large city. The foundations were of stone, and extensive stone ruins are also found in many other sections. Cemented water-cisterns are still found in a good state of preservation. There are also extensive cliff-houses in many portions of the Territory, which doubtless date back to a still earlier age, when the ancient inhabitants were islanders, dwelling in rocky fastnesses overlooking the sea, before the final upheaval of the country in general. These ruins, found in nearly every portion of the Territory, will perhaps furnish the key in time to some enthusiastic antiquarian to unlock the mysteries of the past and to open up the history of the ancient people and its perished civilization. — *Denver News.*

USEFUL NOTES ON WATER. — One gallon of distilled water weighs 10 pounds; one gallon of sea-water weighs 10.32 pounds; 1.8 cubic foot of water weighs one hundredweight; 36 cubic feet weigh one ton, equal to 224 gallons; one cubic foot contains 6¼ gallons. (The English standard, or Imperial gallon, is here referred to.) The average daily consumption of water in towns is sixteen to twenty gallons per head. In pipes the square of the diameter in inches equals pounds weight of water per yard. Example: An inch pipe holds nine pounds per yard. One hundredth inch of rain is about one ton's weight to the acre. A nominal horse-power for a boiler requires one cubic foot of water per hour. Circular apertures are most effective for discharging water, since they have less frictional surface for the same area. The *vena contracta* is the best form of orifice for discharging water. The ordinary speed to run a pump is 80 to 100 feet per minute. The pressure in pounds per square inch of a column of water is the height of a column in feet multiplied by 594, or, for an approximation, one-half pound pressure per square inch for each foot of height. Water, in flowing through an aperture, has a velocity equal to that acquired by a heavy body falling freely from a height equal to the distance between the centre of the aperture and the surface of the water. Doubling the diameter of an aperture increases the flow four-fold. A man can raise water from a well ten feet deep at the rate of thirty gallons per minute. The approximate time occupied in discharging equal quantities of water, under equal heads, through pipes of equal length, varies from 80 for a straight pipe, 200 for a curve, to 220 for a right angle. — *Engineering News.*

LARGE EXPORTATION OF BRICKS TO AMERICA. — The large full-rigged ship *Morayshire*, of Glasgow, 1,428 tons, left Leith lately for Portland, Oregon, direct with 1,485 tons of brick, 360 tons of fire-clay, and 220 tons of cement, being the largest cargo of the kind ever shipped at Leith. — *Journal of Commerce.*

$7,426 FOR A FEW INCHES OF WALL. — Instruments recorded in the Register's Office show that Henry A. Morgan, as President of the New York *Times* Association, has purchased from Orlando B. Potter all that portion of the party-wall of the *Times* building which is erected upon the property formerly occupied by the *World* building for the sum of $7,426, and that Mr. Potter is now to construct a building to be eleven stories high upon the property at Beekman and Nassau Streets and Park Row. — *New York Tribune.*

SOUTH AMERICAN WOODS. — M. Thanneur describes some varieties of South American woods which seem likely to become valuable for engineering purposes. The yandubay is exceedingly hard and very durable. The couroupay is also very hard and very rich in tannin. It bears some resemblance to the quebracho, which is perhaps the most interesting of all and the most used. It is very abundant in Brazil and La Plata. Its diameter varies within the same limits as that of the oak, but the trunk is shorter. It is used for railway sleepers, telegraphic poles, piles, etc. It is very durable, especially when well seasoned. It is much heavier than water, its specific gravity varying between 1.203 and 1.333. Its color is reddish, like mahogany, but it becomes darker in time. On account of its hardness it is difficult to work, and it cannot be readily cut with an axe. It has been introduced into France on account of its richness in tannin. A large proportion of Brazilian leather is tanned by the sawdust of quebracho, but the leather is rather brittle. A mixture composed of one-third of powdered quebracho and two-thirds of ordinary tan gives very good results. — *Annales des Pontes et Chaussées.*

A LEGEND OF COLOGNE. — Adelheid Richmodus, wife of one of the mediæval Senators who swayed the destinies of Cologne, died, to all appearance, and was buried in the vaults of the neighboring Apostelkirche. It was said a valuable ring could not be removed from her hand, and was consequently interred with her. This excited the cupidity of the sexton, who came at night to steal, and failing in his efforts to loosen the ring, tried to sever the finger. Blood flowed; the lady revived and sat up in her coffin, to the horror of the thief. After the first paralyzing shock of finding where she was, she passed through the gates he left open in his flight, and, still wrapped in her winding-sheet, knocked at her husband's door. The servants, on looking out, recognized her, and rushed terrified to their master to say they had seen her ghost; but on calmer reflection, Adelheid continuing to knock and beg plaintively for admission, they concluded she was alive and said so. Richmodus declared the whole a trick of their imagination, and said he would as soon believe his horses were transported to the attic as that his wife lived. As he spoke, the clatter of hoofs proved his incredulity rebuked by a miracle. The door was opened to the shivering lady, who told her story and was affectionately received, becoming "the joyful mother of children," and dying in reality at an advanced age. The horses' heads carved in wood, painted one black and one gray, still look from the top window to convince the skeptic; and the next street, Richmodstrasse, is named after the much-enduring woman. — *London Society.*

ANCIENT RUINS IN SONORA. — Ancient ruins have recently been discovered in Sonora, which, if the reports are true, surpass anything of the kind yet found on this continent. The ruins are said to be about four leagues southeast of Magdalena. There is one pyramid which has a base of 4,350 feet and rises to the height of 750 feet. There is a winding roadway from the bottom leading up on an easy grade to the top, wide enough for carriages to pass over, which is said to be twenty-three miles in length. The outer walls of the roadway are laid in solid masonry from huge blocks of granite in rubble, and the circles are as uniform and the grade as regular as they could be made at this date by our best engineers. The wall, however, is only occasionally exposed, being covered over with the débris and earth, and in many places the sahuaro and other indigenous plants and trees have grown up, giving the pyramid the appearance of a mountain. To the east of the pyramid a short distance is a small mountain about the same size, which rises to about the same height, and if reports are true, will prove more interesting to the archæologist than the pyramid. There seems to be a heavy layer of a species of gypsum about half way up the mountain, which is as white as snow, and may be cut into any conceivable shape, yet sufficiently hard to retain its shape after being cut. In this layer of stone a people of an unknown age have cut hundreds upon hundreds of rooms from five by ten to sixteen to eighteen feet square. These rooms are cut out of the solid stone: so even and true are the walls and floor, and the ceiling so plumb and level, as to defy variation. There are no windows in the rooms and but one entrance, which is always from the top. The rooms are about eight feet high from floor to ceiling; the stone is so white that it seems almost transparent, and the rooms are not at all dark. On the walls of these rooms are numerous hieroglyphics and representations of human forms, with hands and feet of human beings cut in the stone in different places. But, strange to say, the hands all have five fingers and one thumb, and the feet have six toes. Charcoal is found on the floors of many of the rooms, which would indicate that they built fires in their houses. Stone implements of every description are to be found in great numbers in and about the rooms. The houses or rooms are one above the other, three or four stories high; but between each story there is a jog or recess the full width of the room below, so that they present the appearance of large steps leading up the mountain. Who these people were and what age they lived in must be answered, if answered at all, by the "wise men of the east." Some say they were the ancestors of the Mayas, a race of Indians who still inhabit Southern Sonora, who have blue eyes, fair skin, and light hair, and are said to be a moral, industrious, and frugal race of people, who have a written language and know something about mathematics. — *Tucson Citizen.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

282,961. **Bench-Clamp.** — Thomas Crispin, Detroit, Mich.

282,966. **Combined Protractor, Square and Bevel.** — James Duckworth and Eli Smith, Springfield, Mass.

282,975. **Vise.** — Clark Fisher, Trenton, N. J.

282,977. **Combined Register and Ventilator.** — Abraham D. Gallentine, Marion, Ind.

282,993. **Spring-Hinge.** — Henry P. Kochsmeier, Freeport, Ill.

282,996. **Fire-Escape.** — Ogden G. Lee, Poughkeepsie, N. Y.

283,008. **Fire-Escape Ladder.** — Chas. T. Merritt, Hyde Park, Ill.

283,012. **Securing Slabs of Veneering to Buildings.** — Benjamin Morton and Arthur Tilley, Toronto, Ontario, Can.

283,025. **Chimney or Flue.** — Thomas Rowan, London, Eng.

283,038. **Fire-Escape.** — Isaac L. Stover, Centralia, Ill.

283,040. **Auger-Bit.** — Jas. Swan, Seymour, Conn.

283,074. **Manufacture of Wrought-Iron.** — Lucius D. Chapin, Chicago, Ill.

283,093. **Flexible Soft-Metal Sash-Bar.** — Alphonse Friedrick, Brooklyn, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Since our last report nineteen permits have been granted, the more important of which are the following: —

Brush Electric Light Company, two-st'y brick building, n s Monument St., between Constitution St. and Graves Alley.

Agnes Madden, three-st'y brick building, w s East St., between Fayette and Douglass Sts.

John W. Lee, 2 three-st'y brick buildings, e s Green St., s of Mulberry St.

Michael Carlin, 2 three-st'y brick buildings, e s Pennsylvania Ave., between Biddle and Orchard Sts.

Jos. Turner, 13 three-st'y brick buildings, e s North Ave., commencing n e cor. Townsend St.; and 5 three-st'y brick buildings, n s Townsend St., e of North Ave.

Otto Goldbech, 5 two-st'y brick buildings, e s Potomac St., s of Hudson St.

M. L. Day, two-st'y brick stable, in rear of No. 93 Baltimore St., s s, between Stricker and Gilmor Sts.

B. Thornton, two-st'y brick stable, in rear of No. 75 Lee St., n s, between Sharp and Hanover Sts.

L. C. Smith, 2 two-st'y brick buildings, e s Hanover St., s of Fort Ave.

Henry Sieck, two-st'y brick building, in rear of No. 238 Sharp St., w s, between Henrietta and Montgomery Sts.

J. M. Heigh, four-st'y brick back building to No. 141 Charles St., e s, n of Centre St.

Boston.

Building Permits. — *Brick.* — *Boston St.*, near Hamlet St., Ward 20, for Thomas Rice, 6 dwells., 20′ x 35′, two-st'y mansard; Thomas Rice, builder.

Leverett St., *No.* 152, Ward 8, dwell. and store, 20′ x 50′, five-st'y flat; P. F. McGaragle & Co., builders.

Washington St., *Nos.* 989–997, Ward 16, for W. H. Adams, stores and apartments, 50′ x 114′, four-st'y flat; W. H. Adams, builder.

Wood. — *Allston St.*, near Shafts St., Ward 24, for Henry C. Kendall, dwell., 21′ x 33′, two-st'y hip; Philip L. Ritner, builder.

Allston St., near Allston Sq., Ward 25, for M. F. Sprague, 2 dwells., 20′ x 30′ and 15′ x 35′, two-st'y pitch; M. F. Sprague, builder.

Bennington St., near Swift St., Ward 1, for Otis Pease, dwell., 13′ 6″ x 22′ and 20′ x 28′, two-st'y pitch; Edwin J. Turner, builder.

Alleghany St., near Parker St., Ward 22, for Benj. F. Bean, 2 dwells., 18′ x 28′, three-st'y flat; Benj. F. Bean, builder.

Parker St., near Alleghany St., Ward 22, 2 dwells., 18′ x 28′, three-st'y flat; Benj. F. Bean, owner and builder.

Parker St., near Oscar St., Ward 22, for Benj. F. Bean, owner and builder, 6 dwells., 18′ x 28′, three-st'y flat.

Lynde St., near Austin St., Ward 5, for Edmund Noonan, dwell., 22′ 9″ x 24′ 8″; three-st'y flat.

Fifth St., n s, near K St., Ward 14, for Trustee Hawes Fund, 2 dwells., 23′ x 40′, two-st'y flat; W. T. Eaton, builder.

Cook St., between School and Harvard Sts., Ward 24, for Edward P. Whitcomb, dwell., 28′ x 37′, two-st'y pitch; J. H. Wilder, builder.

Ruggles St., *No.* 328, Ward 22, for William Gilligan, stable, 20′ x 25′, two-st'y flat; David Angel, builder.

Oriental Ct., near Phillips St., Ward 22, for Thomas O'Leary, dwell., 13′ x 16′, three-st'y flat; Samuel Rantin, builder.

East Sixth St., rear, near H St., Ward 14, for Michael Deady, greenhouse, 12′ x 50′, one-st'y pitch; Michael Deady, builder.

Alger St., rear, near Dorchester St., Ward 15, for Arthur E. Thompson, carpenter-shop, 20′ x 40′, one-st'y flat; John Thompson.

Unnamed Pl., off Union Ave., Ward 23, for Benj. F. Sturtevant, storage, 35′ 4″ x 55′, one-st'y flat; Samuel T. Case, builder.

Orleans St., near Maverick St., Ward 2, for James Cleary, dwell., 22′ x 34′, two-st'y mansard; Richard Costello, builder.

Brooklyn.

Building Permits. — *Putnam Ave.*, n s, 80′ e Classon Ave., 5 three-st'y brick dwells., tin roofs; cost, each, $3,000; owner, architect and builder, 1045 Fulton St.

Lewis Ave., s w cor. Pulaski St., two-st'y brick store and tenement, tin roof; cost, $5,000; owner, Joseph Fesler, Lewis Ave., cor. Hart St.; architect, T. Engelhardt; builders, W. Rauth and D. Kreuder.

Poplar St., *No.* 19, near Willow St., three-st'y brownstone front dwell., tin roof; cost, $10,000; owner, J. P. Taaffe, 202 Fulton St.; architect, R. B. Eastman; builder, W. J. Kerrigan.

Gates Ave., s s, 150′ e Sumner Ave., three-st'y brownstone front store and tenement, gravel roof; cost, $3,500; owner and builder, L. E. Brown, 126 Herkimer St.; architect, C. E. Cozzins.

Chicago.

Houses. — H. Sierks, architect, has completed plans for a two-st'y dwell. for Mr. A. J. Harding, at 643 Adams St.; cost, $12,000.

S. V. Shipman, architect, has plans ready for 3 three-st'y dwells., for Mr. H. A. Goodrich, on Warren Ave.; cost, $12,000.

Dr. Knox will build 2 three-st'y dwells., on West Van Buren St., to cost $11,600; J. W. Cassell is the architect.

Theo. Karls is the architect for 2 two-st'y houses, for Susan A. Buschick, on North Clark St.; cost, $9,500.

O. J. Pierce is architect for 7 three-st'y dwells. to be built in the North Division, for C. F. Fuller, to cost $35,000.

Mr. R. W. Tonsill will build, on Dearborn Ave., two-st'y dwell., to cost $20,000; Cobb & Frost are the architects.

C. M. Palmer, architect, has plans ready for the erection of 7 two-st'y dwells., on Dearborn St., to cost $20,000.

Chapel and School. — J. J. Egan is architect for the chapel and school building to be erected on Belden Ave., to cost $20,000.

College. — S. V. Shipman, architect, planned the four-st'y and basement addition to the Rush Medical College, on Wood St., to cost $30,000.

Store and Flats. — H. Kley is architect for three-st'y store and flats, to be built on Milwaukee Ave., for J. Bartuska; cost, $13,000.

H. Sierks, architect, has made plans for flats to be built for Gee. Roethel, on South Hoyne St., to cost $8,000.

Warehouse. — John C. Cochrane is the architect for the four-st'y warehouse on Michigan Ave.; cost, $25,000.

Building Permits. — Michael Kinman, two-st'y store and dwell., 1256 West Lake St.; cost, $3,000.

Mrs. Muttoy, 2 two-st'y dwells., 105 and 107 Flourney St.; cost, $6,500; architect, H. Sierks; builder, E. Mensching.

Wm. Lange, two-st'y store and dwell., 3025 Wentworth St.; cost, $3,700.

John Mesenbocher, two-st'y dwell., 554 North Market St.; cost, $3,400.

Mrs. C. Sullivan, three-st'y store and flats, 195 West Twelfth St.; cost, $8,000; architects, Furst & Dudolph; builder, Jno. Mountain.

J. H. Swartz, four-st'y store, 280 to 288 Madison St.; cost, $53,000; architects, Burling & Whitehouse; builder, Jno. Mountain.

E. Nelson, three st'y flats, 39 Ray St.; cost, $7,500; architect, H. M. Hanson; builder, Jno. Mountain.

Joe Bartuska, three-st'y store and flats, 694 Milwaukee Aye.; cost, $13,000; architect, H. Kley; builder, J. Kley.

P. Jyerell, two-st'y dwell., 632 Fifteenth St.; cost, $3,000.

E. L. Brand, store, 67 and 69 Jackson St.; cost, $3,000; architects, Adler & Sullivan; builder, McGregor.

M. Welertesky, two-st'y store and flats, 3641 Halsted St.; cost, $4,000; architect, T. H. Rehwold; builders, J. Lehman & Co.

B. Bierfleld, two-st'y and basement store and dwell., 625 Blue Island Ave.; cost, $3,800.

A. J. Harding, two-st'y dwell., 643 Adams St.; cost, $12,000; architect, A. V. Shipman; builder, N. Cameron.

Geo. Roethel, two-st'y flats, 355 and 357 South Hoyne St.; cost, $8,000; architect, H. Sierks; builder, E. Mensching.

L. & J. O'Neill, four-st'y warehouse, 27 and 29 Michigan Ave.; cost, $25,000; architect, John C. Cochrane; builder, E. F. Gobel.

Antonio Visitti, three-st'y and basement store and flats, 76 North Franklin St.; cost, $4,000.

John Kortes, three-st'y and basement store and flats, 50 Ingraham St.; cost, $8,000.

James Lavery, two-st'y dwell., 3805 Dearborn St.; cost, $3,500.

Henry Dreyer, two-st'y and basement dwell., 302 West Fourteenth St.; cost, $4,000.

John Halbock, two-st'y dwell., 506 West Nineteenth St.; cost, $3,400.

John Koch, two-st'y dwell., 220 Evergreen St.; cost, $3,000; builder, Hageman.

Wm. Lorr, two-st'y dwell., 338 Thirteenth St.; cost, $4,000; architect, F. Kiltenich; builder, Chas. Rupfer.

H. A. Goodrich, 3 three-st'y dwells., 722-726 Warren Ave.; cost, $12,000; architect, S. V. Shipman; builder, W. H. Illiff.

Buethner Bros., three-st'y store and flats, 2610 South Park Ave.; cost, $10,000; architect, H. Sierks; builder, H. Appel.

Albert Bily, two-st'y dwell., 829 Allport St.; cost, $3,000.

Dr. Knox, 2 three-st'y dwells., 789 and 781 Van Buren St.; cost, $11,600; architect, J. W. Cassell; builders, J. W. Cassell & Co.

Susan A. Buschick, 2 two-st'y dwells., 952 and 954 North Clark St.; cost, $9,500; architect, Theo. Karls; builders, Niegelsen & Baden.

Rush Medical College Hospital, four-st'y addition to College, Wood St.; cost, $30,000; architect, S. V. Shipman; builder, W. H. Illiff.

Jacob Ewerts, three-st'y store and flats, 2502 Wentworth Ave.; cost, $5,000; architect, J. Frank; builder, A. Mueller.

James Hart, two-st'y flats, 352 Belden Ave.; cost, $3,000.

Royal Insurance Company, of Liverpool, nine-st'y office-building, 165 to 173 Jackson St.; cost, $500,000; architect, Boyington.

F. Larned, 6 two-st'y dwells., 3600 to 3610 Stanton Ave.; cost, $18,000; architect, W. F. Furber; builders, Oliver & Hill.

E. Huber, three-st'y dwell., 116 Lincoln Ave.; cost, $7,000; architect, J. H. Huber; builders, Ressler & Winekler.

John Heyden, two-st'y dwell., 329 Webster Ave.; cost, $4,000.

D. Goldberg, three-st'y dwell., 146 Pacific Ave.; cost, $4,400; architect, Geo. Vigeant; builder, A. Kaiser.

S. Loeffel, two-st'y dwell., 64 Wisconsin St.; cost, $3,500.

Fred. Grazert, two-st'y dwell., 110 Nineteenth St.; cost, $3,500.

Chicago & West Indiana Railroad Company, three-st'y store and dwell., 200 Fourth Ave.; cost, $1,000.

Chicago & West Indiana Railroad Company, three-st'y store and dwell., 214 Fourth Ave.; cost, $4,000.

John Hortel, three-st'y addition, 471 Nineteenth St.; cost, $4,000.

Rev. B. Barzyuski, chapel and school, Belden Ave.; cost, $20,000; architect, J. J. Egan; builders, Geo. Lehman & Co.

C. Busby, 7 two st'y dwells., 3432 to 3448 Dearborn St.; cost, $20,000; architect, C. M. Palmer; builder, C. Busby.

C. F. Fuller, 7 three-st'y dwells., 400 to 406 Chestnut St., 234 Rush St., and 209 Cass St.; cost, $35,000; architect, O. J. Pierce; builder, L. Weick.

Geo. Schneider, three-st'y store and flats, 2441 Wentworth Ave.; cost, $5,000.

Geo. Koeth, two-st'y dwell., 62 Herndon St.; cost, $3,000.

R. W. Tansill, two-st'y dwell., 332 Dearborn Ave.; cost, $20,000; architects, Cobb & Frost; builder, Louis Weick.

R. L. Pitte, two-st'y flats, 241 West Twentieth St.; cost, $4,300.

Adam Lauer, two-st'y dwell., 590 West Chicago Ave.; cost, $3,200; architect, W. Runde; builders, Lauer & Runde.

H. C. Johnson, three-st'y store and flats, 382 and 384 Belden Ave.; cost, $10,000.

Cincinnati.

Flats. — Geo. W. Rapp, architect, has prepared plans for pressed-brick building for stores and flats, for Peter Scherer, s w cor. Liberty St. and Cent Ave., 50′ x 88′; cost, $25,000.

Heavy Land Sale. — The s e cor. of Fourth and Elm Sts. (50′ on Fourth St., and 100′ on Elm St.), sold recently for $100,000, or $2,000 per front foot. This is probably the highest price ever paid for property in this city, certainly since the war. Harper Bros., of New York City, through their Cincinnati agent, H. W. Derby, were the purchasers, and it is rumored that they will soon erect a new business house on the lot.

House. — Geo. W. Rapp, architect, has prepared plans for brick dwell., 719 Vine St., and remodelling adjacent dwell.; cost, $15,100.

Alterations. — Geo. W. Rapp, architect, has prepared plans for alterations and addition to Bellevue House, Pavilion, head of Elm St.; size of additions, 65′ x 80′; cost, $10,000.

Building Permits. — Edwin Murphy, two-st'y brick building, w s Gilbert Ave., s of Nassau St.; cost, $4,000.

Benj. Readers, three-and-one-half-st'y brick building, w s Rittenhaus St., near Clark St.; cost, $4,500.

Thos. W. Koenig, 6 two-st'y brick buildings, s s Oak Ave., cor. of Orchard St.; cost, $22,000.

Papenbrock & Co., three-st'y brick building, e s Canal St., near Green St.; cost, $3,000.

M. Teltman, two-and-a-half-st'y brick building, e s John St., between Betts and Laurel Sts.; cost, $5,000.

N. E. Dibble, six-st'y stone front, 3 West Fourth St.; cost, $7,000.

Mendel, Rosenburgh & Co., three-st'y brick building, Beddington St.; cost, $6,000.

D. W. Miller, two-st'y brick building, Eggleson Ave., between Fifth and Sixth Sts.; cost, $13,000.

P. W. King, 5 two-st'y frame buildings, w s Colman St., near Bank St.; cost, $10,000.

Cincinnati Gas Company, two-st'y brick building, Eastern Ave., between Main and Spencer Sts.; cost, $15,000.

Frederick Gallat, four-st'y brick building, n e cor. Clay and Allison Sts.; cost, $4,500.

Mrs. Martha Meeks, two-st'y frame building, Kemper Lane, near Nassau St.; cost, $5,000.

Reparis for week, $6,500.

Detroit.

Building Permits. — The following are the more important permits granted since our last report: —

Jos. Deskocher, brick store, 972 Michigan Ave.; cost, $3,200.

J. V. Smith & Son, brick store, 540 Michigan Ave.; cost, $3,000.

M. A. Edwards, brick house, 57 Davenport St.; cost, $7,000.

George Hatt, frame house, 83 Fremont St.; cost, $3,000.

Geo S. Brush, brick store, 151 Michigan Ave.; cost, $4,000.

Jas. Anderson, 4 brick stores, West Larned St.; cost, $16,000.

Popping & Fisher, brick house, 1013 Woodward Ave.; cost, $36,000.

G. W. Lloyd, additions to brick house and new barn, 491 Jefferson Ave.; cost, $18,000.

M. W. Scoville, frame house, 420 Fourth St.; cost, $3,200.

Julius Hess, brick house, 29 East Willis Ave.; cost, $9,000.

Coltus B. Hubbard, brick house, Miami Ave.; cost, $4,000.

Gearing & Co., brick house, Miami Ave.; cost, $5,000.

Michigan Fish Commission, fish hatchery, 334 to 336 Michigan Ave.; cost, $4,000.

John Lerkroeger, addition to brick brewery, cor. Catherine and Propelle Sts.; cost, $9,600.

A. Chapoton, Jr., additions to bank block, Griswold St.; cost, $50,000.

M. A. Scoville, alterations to house, 345 East Larned St.; cost, $3,300.

Kercher & Co., brick dwell., 349 Howard St.; cost, $5,000.

Peter Dedrichs, 2 frame houses, St. Aubin Ave.; cost, $2,500.

New York.

Warehouse.—At 58 Centre St., a four st'y warehouse, 25' x 75', of Philadelphia brick, with granite trimmings, is to be erected for Mr. E. B. Smith, from designs of Messrs. Berger & Baylies, to cost about $40,000.

Store and Restaurant.—A four st'y building, brick and brownstone, 25' x 80', is to be erected, at a cost of $20,000, from designs of Messrs. H. J. Schwarzmann & Co., at 18 Beaver St., for Messrs. Wiehl & Widman.

Labor.—Contractors are being a good deal worried by "walking delegates" of the Trades Union, who have recently stopped work of all kinds on buildings where sub-contractors have non-union men in their employ.

Building Permits.—*Ludlow St., No.* 25, five st'y brick tenement and store, tin roof; cost, $12,000; owner, P. A. Fogarty, 352 East Fourteenth St.; architect, J. B. Franklin.

Washington Ave., No. 1355, two st'y brick dwell., tin roof; cost, $5,000; owner, Philip Herdt, 834 One Hundred and Sixty-ninth St.; architect, J. Kastner.

Washington Ave., No. 1110, three-st'y brick tenement, tin roof; cost, $6,500; owner, Charlotte K. Hanlon, 1108 Washington Ave.; builder, Louis Falk.

Eighty-ninth St., n w cor. Third Ave., rear, two-st'y store and dwell., tin roof; cost, $2,500; owner, Chas. H. Davis, Huntingdon, L. I.; architect, Andrew Spence.

One Hundred and Fourth St., s s, 145' e Madison Ave., five-st'y brownstone front flat, tin roof; cost, $18,000; owner, Thomas Flinn, 313 East Seventy-eighth St.; architect, Andrew Spence.

Fourth Ave., e s, 80' n One Hundred and Fifth St., five-st'y brownstone front tenement and store, tin roof; cost, $12,500; owner, Geo. D. Schmid, 62 East One Hundred and Fourth St.; architect, Andrew Spence.

East Seventy-eighth St., No. 444, five-st'y brick tenement, tin roof; cost, $12,000; owner and builder, Joseph Johnston, 475 Second Ave.; architect, Julius Boekell.

One Hundred and Thirty-third St., s s, 75' w Madison Ave., two-st'y brick stable, gravel roof; cost, $5,000; owner, James Everard, Hoffmann House; architect and mason, Jas. P. B. Remsen; carpenter, W. H. Walker.

Seventy-sixth St., s s, 125' w Ave. A, five-st'y brick tenement, tin roof; cost, $14,000; owner, Patrick Keyes, 352 East Seventy-eighth St.; architect, A. B. Ogden.

Third Ave., n e cor. One Hundred and Forty-ninth St., three-st'y frame dwell., tin roof; owner, Francisca Uhl, on premises; architect, Henry Piering; builder, Adam Kaiser.

Girard Ave., n w cor. One Hundred and Fifty-eighth St., two-st'y frame dwell., tin roof; cost, $3,000; owner, W. J. Brennan, 457' w Nineteenth St.; architect, John E. Kerby.

St. Nicholas Ave., e s, 29' s One Hundred and Sixty-sixth St., three-st'y frame dwell., tin roof; cost, $6,000; owner, Joseph Brennan, 332 Greenwich St.; architect, J. E. Kerby; builder, A. Campbell.

Philadelphia.

Church.—At St. James Church, cor. Twenty-second and Walnut Sts., the Warburton Memorial Column from design of Wilson Bros. & Co., architects.

House.—Spring Garden St., w Thirty-third St., residence for Samuel Woodington, Esq., from plans by Hazlehurst & Huckel, architects.

Store.—Arch St., Nos. 529 and 531, store, 38' x 288', of brick, with brownstone trimmings, ornamental front, from plans by Wilson Eyre and W. E. Jackson, architects.

Building Permits.—*Hope St., Nos.* 1841 *and* 1843, 2 three-st'y dwells., 15' x 30'; J. H. W. Chesnut, owner.

Howard St., n York St., 2 three-st'y dwells.; 18' x 42'; Henry Gill.

Reese St., n Lehigh Ave., 5 two-st'y dwells., 17' x 40'; Wm. Bartholomew, contractor.

North Second St., No. 2714, two-st'y dwell., 18' x 40'; Wm. Kredel, contractor.

Woodland Ave., No. 2657, three-st'y store and dwell., 18' x 37'; Jesse Lewis, owner.

Paul St., bet. Unity and Sellers St., three-st'y dwell., 20' x 65'; Mr. Worrell, contractor.

Jackson St., w Sixth St., 2 two-st'y dwells., 16' x 28'; W. J. Smith, contractor.

Thirteenth St., cor. Cherry St., three-st'y brick building, 18' x 20'; new front and interior alteration; Philip Weaver, contractor.

Brandywine St., No. 1631, three-st'y dwell., 18' x 50'; Adam Retze, contractor.

Twenty-sixth St., n Jefferson St., three-st'y dwell., 18' x 58', also a stable and carriage-house, 14' x 32'; Thos. Shuster & Sons, contractors.

York Ave., e Tenth St., 6 two-st'y dwells., 14' x 42'; also, in "*Herbine Place*," Fifteenth St., n Montgomery Ave., 10 two-st'y dwells., 14' x 42'; also, *Herbine St.*, n Montgomery Ave., 30 three-st'y dwells., 14' x 42', Jno. S. Merrill, owner.

K St., n Kensington Ave., 2 two-st'y dwells., 14' x 28'; J. Keck, owner.

Fifth St., s e cor. Snyder Ave., two-st'y chapel, 40' x 70'; A. S. Miller, Sup't.

Saville St., w Cresson St., three-st'y dwell., 17' x 32'; McIlvain & Cunningham, contractors.

Johnson St., above Twenty-second St., two-st'y dwell., 15' x 30', also two-st'y stable, 35' x 45'; Robert H. Font, contractor.

Chestnut St., Nos. 1315, 1317 *and* 1319, fourth story addition, 19' x 100'; A. A. Catanach, contractor.

Page St., e Sixteenth St., 7 two-st'y dwells., 14' x 45'; also, on *Sixteenth St.*, s Diamond St., 4 three-st'y dwells., 16' x 55'; also, on *Fountain St.*, e Sixteenth St., 3 two-st'y dwells., 14' x 45'; M. Carey Lee, owner.

Palethorp Ave., n Lehigh Ave., three-st'y factory, 40' x 50'; Valentine Lint, contractor.

Park St., e Twenty-second St., 8 two-st'y dwells., 17' x 37'; Jos. Thorp, owner.

Airy St., cor. Lofty St., 2 two-st'y dwells., 15' x 30'; Chas. Dougherty, owner.

Richmond St., w Palmer, 3 three-st'y dwells., 16' x 45'; Jno. S. Baldt & Son.

Tiernan St., Nos. 1230 *to* 1238, 5 two-st'y dwells., 16' x 50'; F. Thuriganger, contractor.

Race St., fourth-st'y addition to store, 30' x 40'; W. P. Knight, contractor.

Wilder St., Nos. 2056 *and* 2058, 2 two-st'y dwells., 15' x 28'; Alex. Wilson, owner.

Germantown Ave., n Huntington St., 8 three-st'y stores and dwells., viz.: one 14' x 50', seven 16' x 50'; Amos D. Kennedy, owner.

Ninth St., s e cor. Fern n St., three-st'y store and dwell., 16' x 25'; Michael Regney, owner.

Cabot St., n Lehigh Ave., two-st'y dwell., 21' x 42'; also, *Frankford Road*, n Allegheny Ave., two-st'y dwell., 20' x 41'; Jno. Cunningham, contractor.

Alteration.—Ninth St., cor. Chesnut St., alteration to store from plans by Wilson Bros. & Co., architects.

St. Louis.

Building Permits.—Forty-four permits have been issued since our last report, twenty-two of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows:—

H. Steffen, two-st'y brick dwell.; cost, $2,500; Herman & Schumacher, contractors.

T. W. Koenig, two-st'y brick dwell.; cost, $3,800; T. W. Koenig, contractor.

G. B. Manghs, 2 adjacent three-st'y brick dwells.; cost, $8,000; J. B. Legg, architect; A. E. Cook, contractor.

Mrs. Goodfellow, two-st'y brick dwell.; cost, $5,000; H. Kennedy, architect and contractor.

Aug. Witte, two-st'y brick dwell.; cost, $3,800; A. Beinke, architect; A. Uhri, contractor.

Samuel Hermann, two-st'y brick dwell.; cost, $9,000; J. B. McElliatrick & Son, architects; T. Manning, contractor.

J. Meyer, two-st'y brick dwell.; cost, $15,000; A. Grable, architect; A. E. Cook, contractor.

Geo. May, two-st'y brick dwell.; cost, $3,900; Chapman & Thursby, contractors.

General Notes.

Atlanta, Ga.—A bill appropriating $1000,000 for a State Capitol is before the Legislature.

Billings, M. T.—Sealed proposals for the construction of a jail and jailer's residence in the town, to be completed by the first day of January, 1884, were received at the office of H. H. Bole, County Clerk.

Henniker, N. H.—The Contoocook Valley Paper Company is building a storehouse.

Lena, Ill.—Church for First Baptist Society; J. C. Cochrane, architect, Chicago; cost, $8,000.

Lonsdale, R. I.—The corner-stone for the new Christ Church was laid on Saturday, July 28.

Lowell, Mass.—The Boston & Lowell Railroad Corporation are about to build a new repair-shop. The new building will be of brick, one-st'y in height, with a width of 100', and a front of about 200'.

New Britain, Conn.—The new block that Giddings Brothers are to build, on the cor. of Main and Commercial Sts., will be 51' x 106', and have three stores fronting on Main St., and one on Commercial St.

Pawtucket, R. I.—The Free Baptist Society has purchased for the location of the new church a portion of the Geo. L. Barnes estate on Broadway. The building of the new church will begin at an early date.

Pittsfield, Mass.—Terry Clock Company is to build a factory, 150' long.

Shakopee, Minn.—Ground is broken for the new City Hall.

Stillwater, Minn.—The ceremony of laying the corner-stone of the First Presbyterian church, on the corner of Third and Myrtle Sts., occurred August 12.

Somerville, Mass.—Ground is broken for the new Natural History Building of Tufts College, which is to stand in front of West Hall, and in line with College Hall and the Goddard Chapel. It will be of Somerville bluestone, will have a front of 180', and will form the central part of a proposed quadrangle. It will be 70' high, in two stories, with the inside walls of brick and the finish of hard-pine.

Tannersville, N. Y.—The corner-stone of a new Episcopal church was laid August 8.

Wellesley, Mass.—Messrs. Shaw & Hunnewell are the architects of the new library-building, which is to be built of rubble, stone and plaster; David Perkins, of Boston, builder.

PROPOSALS.

FURNITURE.

[At Philadelphia, Pa.]

Office of the Secretary,
Treasury Department,
Washington, D. C., August 18, 1883.

Sealed proposals will be received at this office **until 2 o'clock, P. M., of Saturday, September 8, 1883,** for manufacturing, delivering, and placing in position, in complete working order, certain furniture for United States public buildings in Philadelphia, Pa., Charleston, W. Va., Chicago, Ill., and other cities.

Upon application to this office, detailed information will be furnished to furniture manufacturers desiring to submit proposals.

The Department reserves the right to reject any or all bids, or parts of any bid, and to waive defects.

H. F. FRENCH,
402 Acting Secretary.

RIP-RAP GRANITE.

[At Nantucket Harbor, Mass.]

Engineer Office, U. S. Army,
Newport, R. I., August 15, 1883.

Sealed proposals, in triplicate, will be received at this office **until 12 o'clock, noon, on Thursday, the 6th day of September next,** at which time they will be opened in presence of bidders, for extending the jetty at the entrance to Nantucket Harbor, Mass.

The amount to be expended for stone is about $20,000.

The United States reserves the right to reject any or all proposals.

Specifications, blank proposals, and full information as to the manner of bidding, conditions to be observed by bidders, and terms of contract and payment, will be furnished on application to this office.

GEORGE H. ELLIOT,
400 Lieut.-Col. of Engineers.

IRON PIPES AND CASTINGS.

[At Washington, D. C.]

Office of the Washington Aqueduct,
Washington, D. C., August 8, 1883.

Sealed proposals, in triplicate, will be received at this office **until 12 o'clock, noon, on Tuesday, September 4, 1883,** for furnishing 3,000 tons, more or less, of cast-iron water-pipes and special castings for same. The iron pipe will include:—

680 lineal feet, 75 inches internal diameter; 6,700 lineal feet, 48 inches internal diameter; 1,000 lineal feet, 12 inches internal diameter; 2,650 lineal feet, 8 inches internal diameter; 420 lineal feet, 6 inches internal diameter.

For specifications, blanks on which bids must be made, and all other information, apply at this office.

G. J. LYDECKER,
400 Major of Engineers, U. S. Army.

GRATES.

Office of Supervising Architect,
Treasury Department,
Washington, D. C., August 15, 1883.

Sealed proposals will be received at this office **until 12 M., on the 5th day of September, 1883,** for furnishing, delivering, and setting in place, complete, the grates required for the following government buildings:—

31 half-low-down grates, St. Louis, Mo.
19 " " " Albany, N. Y.
3 basket grates, Albany, N. Y.
75 half-low-down grates, Philadelphia, Pa.
2 basket grates, Philadelphia, Pa.
7 " " Paducah, Ky.
8 half-low-down grates, Charleston, W. Va.

Separate bids must be made for grates for each building.

Further information, with diagrams of openings, may be obtained on application at this office.

JAS. G. HILL,
400 Supervising Architect.

RETAINING-WALLS, IRON PIER, ETC.

[At Coaster's Harbor, R. I.]

Bureau of Equipment and Recruiting,
Navy Department,
Washington, D. C., August 17, 1883.

Sealed proposals, in duplicate, for the above enumerated works, addressed to the undersigned, will be received at this office **until 12 o'clock, noon, of the 31st day of August, 1883,** at which time and place they will be opened in the presence of bidders. Plans may be examined, and specifications for the different works, and instructions to bidders may be obtained on application at this office; the Navy Pay Office at No. 45 Milk St., Boston, Mass.; the Navy Pay Office at No. 27 State St., New York City; or on board the U. S. ship New Hampshire at Newport, R. I.

The right to reject any or all bids is reserved.

EARL ENGLISH,
Chief of Bureau of Equipment and Recruiting.
400

COURT-HOUSE.

[At Princeton, Ind.]

Notice is hereby given that the undersigned Board of Commissioners, of the County of Gibson, in the State of Indiana, have adopted plans and specifications for a new court-house to be constructed at Princeton, in said county, and the same are now on file in the office of the Auditor of said county, and that **up to 12 o'clock M., on the 20th day of September, 1883,** sealed bids are invited, and will be received by said Board, at the office of said Auditor, at Princeton, Indiana, for the construction of said court-house, and the contract therefor will be let to the lowest responsible bidder; said Board reserving the right to reject any and all bids. Such bids will be received for the whole work and for the separate parts thereof, and each bid must be accompanied by a good and sufficient bond, payable to the State of Indiana, signed by the bidder and at least two resident freehold sureties, which bond shall guarantee the faithful performance and execution of the work bid for in case the same is awarded to said bidder, and that the contractor, so receiving the contract, shall promptly pay all debts incurred by him in the prosecution of such work, including labor, materials furnished, and for boarding the laborers thereon. Said court-house will be 90' x 120', faced with stone, pressed-brick and terra-cotta, and fire-proof throughout. The plans and specifications therefor may be inspected at said Auditor's office, and also at the office of Messrs. McDonald Bros., architects, Louisville, Kentucky.

Witness our hands this 8th day of August, 1883.

SYLVESTER BENSON,
JOHN S. MEAD, } Com.
JOSIAH KIGHTLY,
Lucius C. Embree, Attorney. 403

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A CURIOUS illustration of the high-handed manner in which the New York trades-unions carry on their affairs at present is furnished by several occurrences which took place recently at new buildings in that city. A coalition of all the unions concerned with the building trades has recently been formed, under the name of the Allied Building-Trades Union, and the managers of this association have undertaken to put in practice for purposes of their own the tactics employed before them by the Plasterer's Union, by employing, like the plasterers, inspectors to visit all new structures, and enforce, by the summary process of calling off their men such demands as they see fit to lay upon the contractors. The first building subjected to this process seems to have been the new Produce Exchange, which was visited by a "walking delegation," and the men in it strictly questioned, to ascertain whether they were members of the Unions of their several trades. As it happened all those reached by the delegation were members in good standing, and were left unmolested, until a fresh arrival of a party sent to put up some fire-proof blocks required the attention of the delegates. On being asked whether they belonged to any Union, the men with the fire-proof blocks replied that they were not mechanics; but they were promptly informed that there was a laborers' union which they could join, and that they must do so if they wished to continue their work. They immediately enrolled themselves as members, and were allowed to proceed with their business.

AFTER this victory, the "walking delegates" visited many other buildings meeting with similar success everywhere. At a new store in process of construction on the corner of Fifth Avenue and Fifty-ninth Street two derrick-men were found who were not members of the union, and the contractor who employed them was requested to discharge them at once. He refused, and the delegates ordered all the Union men in the building, seventy-five in number, to drop their tools and quit work, which they did immediately. The next day the delegates visited the place again, and found the contractor more tractable. On the condition that his Union men should be allowed to come back to him, he promised to discharge the two derrick-men, unless they consented to join the Union. They were called up, and being, apparently, persons of some independence of character, they refused absolutely to join the Union under compulsion, and were accordingly discharged. The seventy-five Union men then came back to their work. What the contractor's conscience said to him for his cowardly desertion of his employés does not appear, but we hope that it will not cease to trouble him until he makes them reparation. At a large apartment-house now building opposite the Central Park the delegates came upon contractors of a different kind. One of these was Mr. Power, a well-known plasterer, and a man of mind besides. Among his workmen were found several who did not belong to the Union, and he was summoned to discharge them unless they joined it at once. To this he replied that he was satisfied with the work of these men, and saw no reason for discharging them. The men themselves declined to join the Union, and all the Union men were thereupon ordered to pack up their tools and seek employment elsewhere. This seems not to have been an easy task, for soon afterward a number of them returned quietly and resumed their work. Unfortunately for them, they were discovered, and disciplined without mercy. Enormous fines were extorted from them, and they were forced again into idleness, while Mr. Power, faithful to his Non-Union men, and they to him, went on quietly with the building. The delegates, finding their dictates resisted, applied to the owners of the estate, who were also constructing a large number of houses near by, but with the help of different contractors, and threatened to call out all the men on all the buildings belonging to the estate, unless the owners would assist them to revenge themselves on Mr. Power and his independent workmen. The reply to this extraordinary proposition had not been given at the last accounts and the Union men were amusing themselves in the meantime by defacing Mr. Power's finished work with lead-pencil marks. It is singular that no question of advance or reduction of wages has entered into the movement, which seems to be directed solely to driving the most intelligent workmen into joining associations whose character, judging from its manifestations, they have good reason for disliking and despising.

A CORRESPONDENT of the *Sanitary Engineer* describes a curious instance of the charring of wood by steam-pipes, which is worthy the attention of those steam-heaters who so strenuously deny the possibility of such a thing. In the case in question the steam-drum of a boiler projected up between the beams of a floor, about three inches from the nearest one, and for some purpose a wooden wedge, about eight inches long, was driven in between this beam and the drum. Steam was carried during the day-time only, at about sixty pounds pressure; and in less than five months after being placed in position the wedge was converted into charcoal through its entire thickness, and even the beam against which it rested, three inches from the steam-drum at the nearest point, was charred brown. As the temperature of steam under a pressure of sixty pounds to the square inch is far from being high enough to char wood under ordinary circumstances, the effect shown in this case must, apparently, have resulted from the slow, but long-continued action of the moderately heated steam, and as charcoal thus formed is said to be very liable to absorb oxygen suddenly, and break out into spontaneous combustion, it is not impossible that the alternate periods of heating and cooling may have developed a chemical action of this kind in addition to the usual effect of heat alone.

THE *Building News* gives some curious details of the provisions for health and comfort which are found by archæologists to have been customary among the better class of householders three or four hundred years ago. Until within a few years, we were accustomed to think of the fourteenth and fifteenth centuries as a period of semi-barbarism in Europe, and our very reading-books held up the habits of the age of Queen Elizabeth as a warning to the infant mind. The works of Sir Gilbert Scott and Viollet-le-Duc, however, presented the mediæval housekeeping in a very different light, and the latter, particularly, seems to have successfully shown that the castles of the fourteenth century were generally much more comfortable and healthful abodes than the Renaissance palaces of a later age. Even in the higher matters of sanitary administration our forefathers may not have been so ignorant as we suppose, and a proof that they were at least familiar with the weapon of internal quarantine which we use rather ineffectually against contagious diseases is found in the historical fact that Henry the Seventh's soldiers, in their triumphant march after the battle of Bosworth Field, were prevented by the inhabitants from entering the town of Atherstone on the ground that they were infected with the sweating sickness, which some of them, as it seems, had contracted in the prisons of the Continent.

IN the matter of domestic hygiene some, at least, of the mediævals were nearly as well off as ourselves. The monasteries, for example, with their admirable system of plan and their careful and thorough provision for warming, cleanliness and ventilation, would put to shame almost any of the great summer hotels of the present day, which closely resemble them

in conditions to be fulfilled. In the religious establishments, it is hardly necessary to say, household wastes would generally be carefully collected for use upon the farm, but in the fortified castles the circumstances were very different, and the disposal of the refuse of a garrison might be a serious problem. In the wildest districts latrines could be, and generally were, built out over the steep escarpment, either natural or artificial, which guarded at least one side of the fortress, but among the rich pastures of England this disposition was neither pleasant nor convenient. In some cases a special tower, open at the top for ventilation, and situated at one corner of the enclosure, seems to have served as a general vault, something after the manner of the modern French *fosse*, but with the difference that the latrine tower was isolated from all the rest of the building, while the Parisians of to-day build the rest of their house directly over their vaults. In establishments not provided with such special towers a kind of earth-closet seems to have been used, provided with a movable receptacle, and in some instances the castle moat, where this was filled with water, was employed as the final outfall. The latter disposition, seems, however, to have been considered objectionable, and a fortified mansion of the fifteenth century, still standing in the middle of the Forest of Arden, has a well-built drain carried under the bed of the moat, and discharging in the meadows some distance away. In minor points of construction, also, our ancestors were not without intelligence. Many of the most ancient chimneys are provided with a vertical flagstone, set half-way up the flue in such a way as to divide the current, allowing the air to pass down on one side of the flue, and up on the other, which as some, but not all of the moderns know, effectually prevents the chimney from smoking.

A CORRESPONDENT asks us for information about an invention which has made some noise in the world of late, for utilizing the rays of the sun in the production of motive power. The points upon which he wishes to be enlightened relate particularly to the value of the invention, and the validity of the patent, which he has heard called in question. Our knowledge of the subject is extremely general, and we should be far from presuming to decide upon the validity of a patent, but we can at least say that many, if not all the points upon which Mr. Culver claims the protection of the law seem to us quite novel. In substance his apparatus consists of a boiler, standing in the middle of a small railway, which extends through a circular arc of about two hundred and fifty degrees. An engine is connected with the boiler, and a carriage carrying a set of reflectors moves upon the railway. The reflectors are pivoted, so that their inclination to the horizon can be changed, and a simple gearing operated by a belt from the engine, drives the carriage, with the reflectors, around the railway at the same time that it tilts the mirrors. In this way, by suitable adjustment, the mirrors can be made to reflect the beams of the sun constantly upon a given spot, the carriage and the mirrors following the solar movement in such a way as to keep the reflected rays always directed toward the intended place. The principle of all this is familiar enough in the common heliostat, which is operated by a spring or weight, and serves to maintain an unchanging sunbeam in a dark room for solar microscopy or investigations with the prism; but Mr. Culver's invention goes beyond the heliostat, in applying the rays themselves to producing the movement. This is done by concentrating the reflected rays, either by means of a lens, or by placing the small mirrors so as throw all their images on the same point upon the boiler, which they heat sufficiently to evaporate the water in it, and generate steam. The specification of Mr. Culver's patent contains twenty-two claims, and it would be strange indeed if he had been anticipated in all the details of so extraordinary a device.

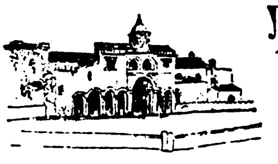
WHETHER the invention, although novel, is practically valuable, is another question in regard to which we should not wish to express an opinion. A great many attempts have been made to utilize the solar heat for the direct production of power, but none have yet made themselves available for general use, although some remarkable effects have been obtained by experimenters. If our recollection serves us, the venerable Captain John Ericsson once devised an apparatus by which the effect of the sun's rays in expanding long metal beams was made to accomplish a considerable amount of mechanical work. Any one who has observed the operation of an ordinary furnace governor, in which the expansion of a small brass rod by a difference of a few degrees in the temperature of the surrounding air serves to operate the dampers with perfect certainty, can easily understand the use which might be made of such means, but no important results followed from the experiments. Later it was discovered that water placed in an iron vessel could be strongly heated by covering it with a considerable number of sheets of glass, and exposing it to the rays of the sun. The multiplied surfaces of glass seemed to prevent the heat of the rays which passed through them from radiating back into space, and we believe that water was boiled, and meat cooked, in this way, but no successful attempt seems to have been made to generate steam under sufficient pressure to give motive power. The subject is an interesting one, and the discoverer of an easy means of absorbing the superfluous heat of our summers, to accomplish mechanical work, will deserve well of mankind.

THE late Baron Foerstel forms the subject of many expressions of respect and regret in the technical journals. A good architect is a person thoroughly appreciated in Germany, and the whole city of Vienna, which flocked a few days before to pay its compliments to Herr von Hansen, the designer of the Austrian Parliament House, on his seventieth birthday, now mourns for his friend and fellow artist. Although his whole professional life had been unusually successful, Baron Foerstel was happy in having chosen to rest his artistic reputation upon one or two buildings, in which he could put his whole heart, rather than on a variety of scattered, and perhaps imperfectly studied works of less importance, and the Votive Church, upon which he spent twenty-six years of fruitful labor, will perpetuate his name, perhaps, as long as that of its imperial founder. His latest important work, the group of buildings for the University of Vienna, is but just ready for occupancy, and the ceremony of opening has taken place without the presence of one whose energy did as much to secure an endowment for the University itself as his skill to provide it with a fitting shelter.

THE English merchants who were so much disappointed at not being allowed to cut an independent canal through the Isthmus of Suez have revived an old project for obtaining a passage between the Mediterranean and the Red Sea by way of the Jordan valley. In its upper course the river Jordan approaches within about twenty-five miles of the Mediterranean, and a canal could without much difficulty be cut to reach it from the harbor of Acre. From this point nearly the whole of the river valley is below the level of the Mediterranean, the Dead Sea, into which it flows, being more than thirteen hundred feet below tide-water, so that the whole would soon fill by gravitation, forming an estuary of the Mediterranean extending to a point within about one hundred miles of the Gulf of Akabah, an arm of the Red Sea. The time required to fill the valley of the Dead Sea and its tributary to the tops of the mountains which now enclose it is estimated at three years, after the completion of a feeder canal twenty feet wide and one-third of a mile long, so that even if the work should be actually undertaken, which is by no means probable, those who wish to visit the places in the neighborhood hallowed by their association with sacred history, as for instance the Sea of Galilee, which would be four hundred feet below the surface of the new canal, will have ample time to do so before their obliteration.

ACCORDING to the New York *Times*, a singular lawsuit is going on in San Francisco. It seems that certain workmen, in excavating for the foundation of a building in the city, came upon a vein of black sand, in which some of them, who were experienced miners, detected grains of gold. The vein was by no means rich, a trial with the ordinary gold-washing apparatus only yielding fifteen or twenty cents in gold to the panful of sand, but the men immediately laid claim to the entire lot, under the United States law regulating the rights of the discoverers of precious metals. As the land is valued for building purposes at sixty-five thousand dollars, a sum far greater than any probable profits from gold-mining operations upon it, the owners very naturally object to delaying their building, and regard the miners' claim as a mere scheme for annoying them. It must be confessed that it has something of that air, and if it is true, as is often said, that all parts of the soil of San Francisco are more or less auriferous, there seems to be no reason why all the most valuable portion of the city might not be staked out into claims by a few enterprising blackmailers.

ARTIFICIAL STONE AS A BUILDING MATERIAL.[1]—II.



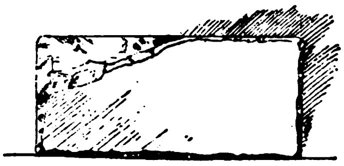
San Domingo Cathedral.

THE high antiquity of prehistoric remains is frequently authenticated by the presence of the "sun-baked bricks" found amongst them. The *Encyclopædia Britannica*, in an article on St. Jean d'Acre (a town and seaport in Syria, and in ancient times a place of some celebrity), says: "Its great antiquity is proved by fragments of houses that have been found, consisting of that highly-sunburnt brick with a mixture of cement and sand, which was only used in erections of the remotest ages."

In Scotland, Ireland and Wales it has been found that the most durable material of those old "castles of the gallant clans" is concrete, in which small cobble-stones were imbedded to form a solid piece of masonry.

The Moors have left samples of their artificial stone inwrought upon the rock of Gibraltar, which have withstood successfully the storms of ten centuries. The Colosseum at Rome presents further examples which have nobly resisted the tests of time; the cisterns of Solomon, near the city of Tyre, which are of still higher antiquity, are almost complete in their preservation; and at Jerusalem there are to be seen five immense courses of Cyclopean masonry, the base of the wall of the city (now enclosing the Mosque of Omar), supposed to be a remnant of the wall of the Temple of Solomon, which, as the record tells us, was "set in its place *without the noise of the hammer and the axe.*"

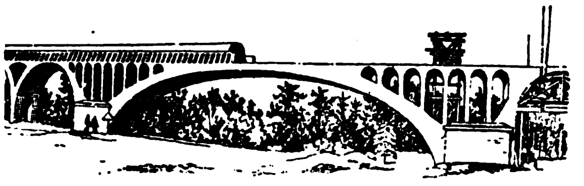
Scientists have suggested that the Pyramids were mainly built of artificial blocks, manufactured upon the spot, from the sands of the surrounding plain, by some cunning process which has perished with the builders; and travellers have claimed that the Diocletian or "Pompey's" Pillar, and the ruins of Baalbeck and Palmyra are mainly of artificial stone. Whatever may be said of these, we have in the actual measurements of the enigmatical "coffer" in the king's chamber of the Great Pyramid, indubitable evidence of its original plasticity. In the first place, we find it depressed upon all its sides, from the corners toward the centre, and *unequally* so. The illustration which we give of the coffer shows its east side, which has been sadly mutilated by tourists, the southern corner being chipped away about two-fifths its height. The mean depressions are at the north end 0.26 inch, at south end 0.19 inch, at west side 0.20 inch, and at east side 0.01 inch. They are observable vertically as well as horizontally. At the south end of the west side there is no depression perceptible; while at the north end of the same side the depression is 0.20 inch, and on the south end, at different distances from east tò west, the depressions are 0.08, 0.12 and 0.14 inch. Upon all sides the coffer is highly polished over all these inequalities. Now no one acquainted with the simplest means of working natural stone would look for these inequalities, and for the corresponding *bulging out upon the inner surfaces* which we find to exist. The square, the plummet and the rule would have done their perfect work before the polishing, and if the depressions had been *intentional*, they would have been *regular*. Again, if we take the superficial outside measurements of the coffer, we find the same irregularity. On the east side near the bottom we have a length of 90.5; ten inches below the top, 90.15; on the top, 90.20. On the west side near the bottom, 89.2; near the top, 89.95; at the top, 90.05; mean length, 90.01. At the north end near the bottom, 39.05; near the top, 38.7; at top, 38.67. At south end near bottom, 38.8; near top, 38.6; at top, 38.5; mean width, 38.72. From all which we argue that the coffer was moulded in its present position from plastic material, and that it became thus slightly warped, or shrunken, as it dried — in short, that it is of artificial stone and not of "porphyry," of "black marble," or of "a darkish variety of red and possibly syenitic granite," as has been variously asserted.



Coffer in the Great Pyramid.

Coming down to a later period and a little nearer home, we have in the city of Santo Domingo some of the most interesting historical monuments of this material. This is the oldest existing settlement by white men in the New World, being founded by Bartolommeo Columbus in 1494. Although built on a solid limestone formation, the city is surrounded by a wall of artificial stone, eight feet thick, built (in 1506) of *mamposteria*, "a composition of earth, powdered stone and lime." Many of the more ancient houses and public buildings of the city, constructed of this material, are still standing and are remarkable for their solidity: the cathedral, especially, in which the remains of Columbus and his brother Bartolommeo reposed for two and a half centuries, which was begun in 1512, and finished in 1540; while on the opposite bank of the river the so-called "Castle of Columbus," a fortified stone house subsequently built by Diego Columbus, the son of the Great Admiral, is in ruins.

We also show an illustration of a section of the Vanne Aqueduct, in France, while under construction. Gen. Gillmore characterizes this as "the most important and costly work that has yet been undertaken in this material," being thirty-seven miles in length. This aqueduct, which supplies the city of Paris with water, traversing the forest of Fontainbleau its entire length, comprises two and a half to three miles of arches (some of them as much as fifty feet in height), eleven miles of tunnels, and eight or ten bridges (from seventy-five to one hundred and twenty-five feet span) for the bridging of rivers, canals and highways. The smaller arches are half-circles, and are generally of a uniform span of thirty-nine feet, four inches, with a thickness at the crown of fifteen and three-fourths inches. Their construction was carried on without interruption through the winter of 1868–69 and the following summer, and the character of the work was not affected by either extreme of temperature. The spandrels were carried up in open work to the level of the crown, and upon the arcade thus prepared the aqueduct pipe was moulded of the same material, the whole becoming firmly knit together into a perfect monolith. The construction of the arches was carried on about two weeks in advance of work on the pipe, and the centres struck about a week later.



The Vanne Aqueduct, France.

The light-house at Port Saïd, in Egypt, is another interesting structure of this material. It is one hundred and eighty feet high, without joints, and rests upon a monolithic block of the same material containing nearly four hundred cubic yards.

An entire Gothic church, with its foundation walls and steeple in a single piece, has been built of this material at Vesinet, near Paris. The steeple is one hundred and thirty feet high, and shows no cracks or other evidences of weakness. M. Pallu, the founder, says that "during the two years consumed by M. Coignét in the building of this church, the material in all its stages was exposed to rain and frost, and it has perfectly resisted all variations of temperature."

House of G. A. Ward, Esq., New Brighton, N. Y.

But we have upon our own shores a building ante-dating these structures nearly thirty years, an illustration of which is given above, and a description of which was given in the *American Architect* of April 7. This is the residence of the late George A. Ward, Esq., at New Brighton, Staten Island, familiarly known as "the cement house," built in 1837, and ten times more solid to-day than the day it was erected. There is no more exposed place to test the stability of this material than the north shore of Staten Island, where this building stands. We confess to some misgivings as we approached it last summer, not having seen it for about thirty years, but we left it more than satisfied, and to such of our readers as require the test of Thomas, the doubter, we commend a pleasant trip over the Bay of New York, and a personal inspection.

We are enabled, also, to give an illustration of another building referred to in the same article — the residence of Wm. E. Ward, Esq., at Port Chester, N. Y. This is beyond doubt the most expensive private residence of the kind yet erected in this country. It is a perfect monolith, from the lowest line of the cellar wall to the top course of its towers, and is a monument at once of the enterprise, taste and munificence of its proprietor, a monument, too, which

House of W. E. Ward, Esq., Port Chester, N. Y.

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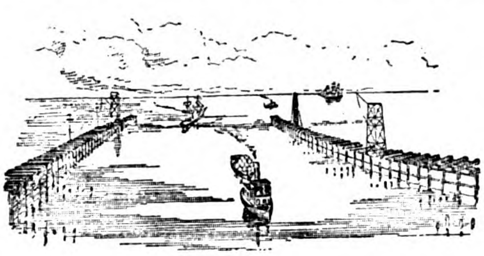
[1] Continued from page 159, Vol. XIII., No. 380.

is likely to endure when some other monuments have crumbled in decay. A full description of this building was given in the *American Architect* of August 17, 1877, and a further description was read before the American Society of Mechanical Engineers, at their recent meeting in the city of Cleveland. Our illustration presents the rear view of the house, although far less beautiful than the front, as the tower here given is employed as a distributing reservoir for the premises, containing two tanks, of five thousand and three thousand gallons' capacity, one above the other, with twenty and forty feet head of water. Other views of this interesting building may be found at the office of Robert Mook, Esq., architect, New York, and to those of our readers who can make it convenient, an actual visit to the premises will well repay the trouble.

Perhaps the severest tests to which the material has ever been subjected were in the great Chicago fire of 1871. While granite was chipped and splintered into fragments, while limestone was reduced to powder, while sandstone was disintegrated, and iron twisted into fantastic shapes, artificial stone alone remained intact, and was in shape to be immediately re-laid. Several instances could be given, conspicuous among which, however, is the front of the store 114 Monroe Street, which, although thrown down by the failure of its iron supports, was taken up, stone by stone, and re-laid. Many of the stones were placed in their original positions; some few were fractured by the fall, and had to be replaced by fresh ones, but none were disintegrated or fractured by the fire, and all were utilized. The front stands to-day exactly as it did before the fire.

The architect is often required to manage a sea-wall or a cellar-wall where the action of water is to be considered in connection with the safety of his superstructure. And here we claim the vast superiority of this material. In basements it will be found not only water-proof, but *rat-proof.* The United States Government has recently employed it as the base of a light-house in the Chesapeake, where heavy masonry had proved inadequate, and they would have done better if they had followed the example of the French Government in the construction of the light-house at Port Saïd, and constructed the whole building of the same material. As a sea-wall, the jetties of the Mississippi are perhaps the best example we have in this country. The illustration we give shows the outlet of the jetties passing into the Gulf, and from it the reader may form a tolerably correct idea of the work. When we consider that this great river is the outlet of twenty of our States and Territories, covering an area of 750,000,000 acres — the granary and the principal cotton-producing region of the world, the importance of these jetties cannot be over-estimated. And hand-in-hand with their far-reaching commercial value is the triumph they have so signally achieved for artificial stone; for it must be conceded that without this element of success, the jetties would have been a failure. Indeed, they had already proved so, and in less energetic hands they might have been abandoned. The jetties themselves, primarily jets or projections of wicker-work, anchored in place and secured in position by rubble and heavy stone, proved inadequate to resist the easterly storms that sometimes prevail, and it became evident that some further protection of the work was required. Heavier stones, some of them weighing three thousand pounds, were accordingly and with great difficulty anchored upon the jetties; but these proved also insufficient. Resort was now had to monolithic masses of artificial stone, and they have proved successful where nothing else could; some of the blocks being thirteen feet in width, five feet thick, and fifty-five feet long, and weighing more than two hundred and sixty tons. One mile of the east jetty and half a mile of the west were thus effectually protected, and so complete were the appliances employed upon the work that it required only the hands of two men to mould them and place them in position.



The Mississippi Jetties.

The jetties at the mouth of the Suez Canal are of a cheaper quality of béton, and are not monolithic, the blocks weighing only about twenty tons; but they are sufficient for the purpose, eighteen thousand of them being employed in the work.

From the scope covered by the illustrations we have given, the far-reaching utility of this material is quite palpable. Its durability is established beyond cavil, and it has the approval of the most eminent architects and engineers of both hemispheres. While other material is constantly undergoing disintegration and decay, this as constantly improves by age. In the air, in the water, in the fire, and in fact under all imaginable circumstances, the certainty of using it with success is one of the greatest of its recommendations. H.

Correction. — In our extract from the report of the chief engineer of Cincinnati, page 82, No. 399, the name of that gentleman was incorrectly given: it should have been printed H. J. Stanley.

BUILDERS' SCAFFOLDING.[1] — XIV.

MECHANICS. — III.

The intuitive ability to mentally analyze the directions taken by the component strains, tension and compression, due to given loads on certain combinations of elementary members, should be the first aim of the student to attain. It will naturally lead to the modes adopted in practice, of determining the proportional distribution of loads amongst the various parts of any generic system of structural combination, and these in turn must be preliminary to the rules of proportioning a framework structure to sustain given loads or pressures. Thus there are three distinct leading processes involved in arriving at the proportioning of the parts in the design of a structure, and it is advisable to have this clearly before the mind of the student, as it will direct him to avoid confusing his mind with matters relevant to other processes than those on which he is engaged for the time being.

45. *The resolution of forces* is the reverse of the process of *composition*, and consists in finding two or more forces, of definite directions and magnitudes, the combined effect of which shall be equivalent to a single given force in direction and magnitude. No force can produce any effect in a direction at right angles to its own line of action, because the components are independent of each other, each representing the whole effect of the resultant. The lines of action of components must intersect lines of action of the given force, the three lines of action being in one plane.

46. In mechanics, forces, pressures, thrusts, tensions and velocities can be geometrically represented in magnitude and direction, by straight lines of definite length in required positions, drawn to a scale of equal parts, whereby an inch shall represent a convenient number of pounds' weight, equivalent to the intensity of the given force.

47. If two adjacent sides of a parallelogram represent, in magnitude and lines of action, two diverging forces conjointly applied to a point, then the diagonal of such parallelogram, drawn from the point of divergence to the opposite angle, will represent the equivalent single force, in magnitude and direction, called the "resultant." This constitutes the important principle in mechanics known as the "parallelogram of forces," and from it is derived the "triangle of forces" and the "polygon of forces."

48. To those working mechanics unaccustomed to consider forces represented geometrically on paper as above indicated, it may be a help to a clearer comprehension to treat it as if the velocity of motion imparted by the respective forces would in the same time carry the body along the adjacent sides which we assume to be part of a parallelogram; then, by drawing the two remaining sides parallel to these representative sides, we complete the parallelogram, and can now draw the diagonal as above; then these laws become the measure of the forces in their relative directions, and by comparison of their lengths with any convenient recognized unit-scale which shall represent a unit of magnitude, we derive an easy means of estimating the intensities or magnitudes of these forces.

49. Scaling forces on a diagram may seem incongruous to the uninitiated, and therefore perplexing; but there is really no more perplexity in scaling eight pounds, or eight hundred pounds, or eight tons to an inch, than in scaling the dimensions of a house on a drawing of eight feet, or any other number of feet, to an inch. As forces are thus represented by straight lines, there is no difficulty in conceiving that forces may have any ratio to each other in respect of magnitude. Forces whose lines of direction coincide can be added or subtracted, just as any other magnitudes, as feet, etc., can be added or subtracted.

50. When a force acts upon a rigid body, which is not susceptible of change of form, it is transmitted by the rigid body along its line of direction, and may be supposed to act at any point of that line; and this takes place whether the line of action of the force is contained within the body, or is not.

51. If we take Figure 37 to illustrate a case of the parallelogram of forces, in which the two converging forces are f^1 and f^2, whose lines of action intersect, and which are applied to a material point O, they being represented in given magnitude and lines of action by the adjacent sides *o b* and *o a* of the parallelogram, the arrow-heads indicating the directions in which the given forces act, the same mechanical effect would be produced on the point O to propel it in the direction of the diagonal by the resultant 3, as by the two given forces f^1, f^2, if substituted therefor. If the resultant force is exerted in the direction of the arrow-head, motion of the body O along diagonal 3 will ensue; but if exerted in the direction opposite to the resultant the body at O will be stationary, for equilibrium or equality of opposing forces thus establishes a balanced counteraction between these opposing forces, *i e.*, between the resultant and its components.

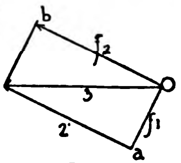


Fig. 37.

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[1] Continued from page 52, No. 397.

52. Let Figure 38 illustrate a practical example of rectangular components of a force, in which the directions of the components lie at right angles to each other; suppose that the parallelogram of forces is drawn to a scale of 100 pounds to one inch; then the side O A will represent 100 pounds, and the side O B 50 pounds, which forces are applied to the material point O in directions perpendicular to each other; then their resultant will be represented in direction and magnitude by the diagonal of the parallelogram, which will scale 111.8 pounds. We can prove the correctness of the scale by aid of the 47th proposition, Euclid, Bk. I, as the opposite sides of a rectangle are equal, the side opposite to O B is equal to it, and as all the angles in a rectangle are right angles, we may take either two sides, above or below the diagonal. $\sqrt{50^2 + 100^2} = 111.8$.

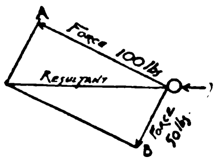

Fig. 38.

53. What has been said may serve to guide the student to the process of finding the resultant of component forces and *vice versa*, but it is unnecessary in practice to draw the whole of the parallelogram, because we have recourse to the principle known as the *triangle of forces*, whereby three lines representing the two components and their resultant acting on a point in equilibrium form a triangle by taking the sides in order. Thus in Figure 37: if from end *a* or *o a* a line 2′ equal and parallel to *o b* be drawn, assuming only the two force lines $f^1 f^2$ to have been drawn, the farther end of *a*2′ will fix the farther extremity of resultant *O*3, which can be drawn in, without completing the parallelogram, the three lines f^1, 2′ and 3 taken in succession forming the required triangle; hence the three forces represented by f^1, 2′ and 3 if applied directly at point O would be in equilibrium.

54. The converse of this proposition is true: thus, if the three forces are in equilibrium, and the triangle be constructed having its sides parallel to the directions of the forces, its sides will be proportional to the magnitudes of the forces. The following rule for compounding the triangle of forces will extend to compounding any number of forces by following the same principle: —

RULE.—*Draw from extremity of one of the component forces a line equal and parallel to the other component, and join its farther end to the point of application, which gives the resultant, and completes the third side of the triangle.*

In Figure 39 if three forces, A B W, acting at their point of intersection upon a rigid body, are in equilibrium, keeping the body at rest, then three lines drawn consecutively parallel to their respective directions will form the required triangle; hence the direction of the third force returns through the point of application of the other two forces. Thus, lay off to any convenient scale, as 200 pounds or 2,000 pounds, whether of weight or static pressure, to an inch on the vertical line W W, any length, which call W, to represent by scales the weight 100 pounds suspended by it, and from the lower extremity of this portion draw a line, which call B, parallel to force B, and produce force A to intersect it; then the three lines of the triangle, W B A, parallel to the directions of the three forces in equilibrium will be proportional to these forces, and may be scaled off by the scales, by which the weight was laid.

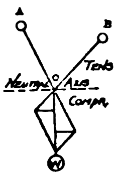

Fig. 39.

55. (*a*) Any force acting at a definite angle can be determined if we know either component and the angle of the inclination of its othet action from the geometrical relations of the parts of a triangle. (*b*) If two of three forces which balance meet, the third force will pass through the point of intersection of the other two forces. (*c*) By knowing the magnitude and direction of two intersecting forces, the magnitude and direction of their resultant can thereby be found. (*d*) If the directions of any two forces into which a single force is resolved be given, the amount of these components can be found by the above process. (*e*) A small force may counterbalance two larger forces the more nearly opposite are the directions of the larger forces, in order that the latter may counteract each other the more.

56. (*f*). If three members of a structural frame meet, as at Figure 40, C, the strains to which all are subject are all either tension or compression, as indicated by the double arrow-heads, *i. e.*, in both directions on each line representing the forces B C D.[1]

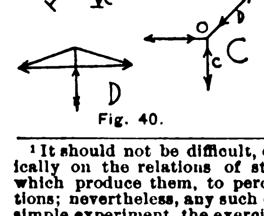

Fig. 40.

57. If two of three members of a truss, meeting at a point, are on the same side of the line of the third member, as for instance below a horizontal third member, they are affected by *different* strains; the members which have the greater angle between them have the same kind of strain, the intermediate member having an opposite strain. Thus, in Figure 40, Diagrams A and B, if the line B is in tension in both diagrams, then in Diagram A, C is also in tension, and D in compression. But if D is in tension, then both B and C are in compression. Then in Diagram B, if line B is in tension, D is also in tension and C in compression; but if C is in tension, both lines B and D are in compression.[2]

58. In Figure 41, if the vertical mechanical effect of a given force be represented by the side 3 of a triangle (right-angled at 3–4), drawn to a scale of twenty tons to one inch, and the geometrical relations of the sides of the triangle are known, the longitudinal strain in the oblique side, 5, will exceed the vertical strain in 3, by the number of times 3 is contained in 5. Thus, if we use for illustration the well-known numerical proportions of the sides of a right angled triangle, 6 feet, 8 feet, and 10 feet, *i. e.*, the double of the figures distinguishing the sides of the diagram employed by masons, carpenters, etc., to lay off on the ground a right angle for the walls of a building, etc., the right angle being formed between the adjacent sides 6, 8 (represented by 3, 4, in the diagram), and the hypothenuse 10 (5 in diagram), according to Euclid, Prop. 47, Bk. 1; *i. e.*, $\sqrt{6^2 + 8^2} = 10$, we find that the strain in 5, being 10 tons, and that in $3 = 6$ tons, then the strain in 5 is equal to $\frac{10}{6}$, or $1\frac{2}{3}$ times the vertical strain, by the principle explained in paragraph 42 (page 52, No. 397), and similarly that the strain in $4 = \frac{8}{6}$, or $1\frac{1}{3}$ times the vertical strain. This is a graphical representation of three forces in equilibrium in the same plane. Now to reproduce the parallelogram of these three forces, draw the two remaining sides of it parallel to the two shorter sides, 3, 4; then side 5 will be the diagonal of the parallelogram, and the resultant of the two component forces 3 and the opposite of side 4, or of 4 and the opposite of side 3, acting at either end of the diagonal, and in either case there will be equilibrium.

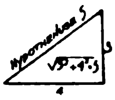

Fig. 41.

59. The lines representing forces may be inclined at any angle, equally or unequally, as for instance with respect to the line of gravitation (vertical), and may all be of equal or unequal length; in fact, this useful principle of the geometrical representation of the direction and magnitude of forces of any kind is applicable to their composition and resolution wherever the sides of any triangle, right-angled or oblique, are parallel respectively to the direction of three separate forces, acting in the same plane, which are in equilibrium against a material point; then the three sidesof the triangle will be relatively in proportion to the respective forces which they represent, in direction and static magnitude; and if one of the forces be known, the others can be measured by the scale of the known force.

KEIM'S PROCESS OF MINERAL PAINTING.

A NEW process of mineral painting, invented by Herr Adolph Keim, of Munich, was exhibited in operation and by executed specimens at the Art Training School, South Kensington, on Saturday afternoon. Mr. T. Armstrong, the art director, explained that when he visited the Art Exhibition at Nuremberg some months since, he saw numerous specimens of this new form of decoration. It was to some extent analogous to distemper painting, and offered facilities resembling those possessed by the antique decorators for the rapid execution of ornamental paintings, scrolls, and arabesques on a surface of gesso or plaster without reflecting the light. The Science and Art Department purchased two large pieces illustrating the process, which were now hung at a proper level in the Architectural Court at South Kensington, and Herr Schraudolph, a Munich artist, had been engaged during the present term to execute work by this process before the students of the National Art Training School. Some specimens of that work, life-sized studies of female figures and floral decoration executed on canvas, and smaller sketches on tile, glass, slate, and marble surfaces, were exhibited in the room. At the conclusion of Mr. Armstrong's explanation, Herr Schraudolph showed to the audience how the work was done, the outlines being traced on a ground kept moist by a spray, and then filled in with moist colors and fixed by repeated sprays of potash water-glass, after which carbonate of ammonia and benzine were applied to the surface. Skill and judgment are needed to insure that the process of fixing is not carried too far, or a troublesome and unsightly efflorescence is formed on the surface similar to that

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[1] It should not be difficult, even for those unaccustomed to reason mathematically on the relations of strains to the directions of the action of the forces which produce them, to perceive the truth of this and the next two propositions; nevertheless, any such can easily re-affirm their conviction of it by very simple experiment, the exercise of which will no doubt inspire clear and certain ideas of the action in these, as well as in other arrangements of the forces, around a single point, and to advance from this to a transfer of the resultant force to another point connected therewith in a system, as in trusses supported at one or both ends: If strings be arranged in the relative positions of this figure, now by pulling on one of them, the strains will all be in tension. But if small rods be similarly arranged, and a *push* be exerted against one of them, they will all be in compression; now if a string be substituted for either of the rods, when the push is exerted the string will collapse, as it cannot resist compression.

[2] If similar experiments be made with strings and rods arranged as in the two diagrams of this figure, and also in a reverse arrangement, *i. e.*, by placing the *two* lines *above* the third line, B, which is assumed as the normal, and also by making the normal line vertical, and placing the two lines to the *right* and also to the *left* of it, and alternately applying the contrary forces *push* and *pull*, as required by the proposition, and by thus experimentally attaining a familiarity with the action of three forces around a point in various positions with regard to the *normal* line, and also in various other relative positions amongst the lines of each, it will be a much more valuable exercise to most minds than mere book demonstrations alone, and prepare the mind to readily realize and formulate the composition and resolution of any complexity of combination of forces. It will be noted that in all these cases the lines of action of the three forces are in the *same plane*; otherwise, the forces represented by the strings and rods would not be in equilibrium.

which disfigures the frescoes in the House of Lords. As to the permanency of the process Herr Schraudolph stated that some work which had been done on marble ten years ago, and other specimens on canvas two years ago, showed no signs of deterioration at present, but the process was quite a modern one. Mr. Armstrong added that there was no attempt to simulate tapestries, and any development in that direction resembling the dyed fabrics now to be seen in the Bond-Street and Regent-Street show-rooms was to be deprecated. It was equally as effective as tapestry, and as could be seen from the exhibits, allowed a wide range of color.

The following description of the process has been prepared by Professor Church: —

Herr Adolph Keim's process of "Mineral Painting," although identical in principle with the stereochromy of Fuchs, differs from that process in several important particulars. For the simple mortar, or plaster, of lime and sand generally used in stereochromy as the painting-ground, Herr Keim substitutes a composition made by the careful admixture of 4 parts quartz sand, 3½ parts marble sand artificially prepared and free from dust, ½ part infusorial earth, and 1 part quick-lime slaked with distilled water. The pigments are admixed with various substances before use, so as to render the action of the fixative solution upon them, when the painting is complete, more uniform. The pigments are also treated with alkaline solutions (of potash or ammonia), so that any change of hue which might ensue from the use of alkaline liquids in fixing the paintings may be anticipated by treating the paints themselves before use with the same solutions. But not only do the pigments and the materials of the painting-ground offer novel features in this process of Herr Keim, but the fixing of the painting with a hot solution of potash water-glass and its subsequent treatment with a solution of carbonate of ammonia differ from the process adopted in stereochrome painting. It should be stated that paintings may be executed not only upon external and internal walls coated with the specially-prepared plaster, but also upon tiles, slate, glass, etc., similarly coated, and even upon canvas, which has been washed with baryta water, and is kept moist with a fine spray of distilled water. The operations of "mineral painting" may be thus summarized: upon an ordinary but perfectly dry mortared surface a coat of the painting-ground material is laid without "floating;" a thin coat, but rough and porous, being secured. Then the dry painting-ground is soaked with a solution of hydro-fluo-silicic acid. When the ground is sufficiently dry to be again absorbent, it is treated with a solution of potash water-glass. The outlines having been traced upon the ground, kept moist with a fine water spray (distilled or rain water), the painting is carried out with the prepared colors, which are kept in glass bottles, in a moist, pasty condition. These colors, it has been before stated, contain certain admixtures, as the hydrates of alumina, magnesia or silica, oxide of zinc, carbonate of baryta, felspar, powdered glass. The colors used are those which have been found available for the stereochromic process. The fixing of the picture is accomplished by means of a hot solution of potash water-glass, thrown against the surface by means of a spray-producing machine, in the form of a very fine spray. This fixing done, by several repetitions of the process, a solution of carbonate of ammonia is finally applied to the surface. The carbonate of potash, which is thus quickly formed, is removed with repeated washings with distilled water. Then the picture is dried by a moderate artificial heat. Finally a solution of paraffine in benzine may be used to enrich the colors, and further preserve the painting from adverse influences. — *The Building News.*

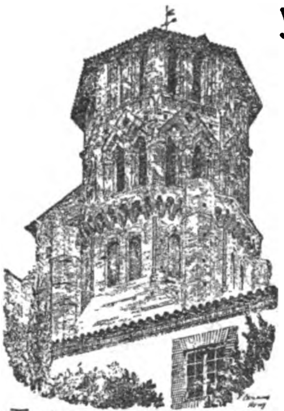
A NEW WAY OF REMOVING A BLUFF.


FROM CHURCH OF NOTRE DAME. PARIS

THE hydraulic machinery which has been brought to this city to be used in washing away the threatening bluffs which hang over the track of the Milwaukee road, two miles west, was put to a test yesterday. The best possible arrangements for undertaking the difficult work have been made. From the Worthington pump, which is considered the more powerful of the two on the boat, an eight-inch pipe extends up the bank to a height of about sixty feet, where it reaches the road-bed of the track. It then runs under the track nearly to the base of the bluff and terminates in a movable iron nozzle, with a two-inch end. From the point where the nozzle is directed toward the bluff begins a sluiceway constructed of boards and about two feet deep. This sluiceway leads under the track, downward in a diagonal course to the river. The pipe through which the water rushes to the nozzle is well secured. The sluiceway is constructed on timbers, and is strongly braced. As the nozzle points toward the bluff, without the water rushing from its mouth and the sluiceway is dry, there is nothing particularly curious or interesting in the machinery's appearance; but when the big boiler at the water below begins to puff, the powerful pump commences action, and the glittering stream shoots from the mouth of the nozzle with lightning speed, and, hardly spraying, strikes the bluff with terrific force, boring deep into the earth and causing the dust to rise in clouds, some appreciation of the force of the water can be gained. Then, too, the practical result of the aqueous battering-ram's power is seen in the mass of mud which rushes through the sluice. Hundreds of tons of earth, made soluble, melt away in an hour and are swiftly carried off through the apparently small board runway to the river below. When the pumps started yesterday afternoon it was just half-past two o'clock. General Superintendent Clark, General Master-Mechanic Lowrey, Assistant Master-Mechanic Campbell and Division Superintendent Jackson were present, directing the movements of about thirty men who assisted the machinery in its work. As spectators, fully fifty gentlemen from this city were also on hand, watching with great interest the action of the water on the bluff. At the boat below J. M. Finch, of Milwaukee, who superintended the putting together of the hydraulic machinery, and Engineer Joseph Powell, of Yankton, waited for the signal to "set her going." The boiler showed one hundred and twenty pounds of steam — a full head. The sluiceway was inspected and strengthened. S. Coleman, of this city, stood at the nozzle, clad in a rubber suit, while four assistants were near the nozzle similarly protected from the water and ready with shovels and hoes to clear the sluice at its mouth from obstructing masses of turf or dirt. When all was ready the signal was given and the water began to rush through the pipe and pound away at the bank. In five minutes immense quantities of the dirt were melting and rushing through the sluice. The cutting was done in a scientific manner. First, the water was sent against the bluff sixty feet up, and holes bored to weaken its dry solidity. Then the boring began underneath, and the foundation of a mass of earth sixty feet high and ten feet thick by about fifty feet in width was dug away. All at once the big chunk gave way and with vast clouds of dust and much noise fell downward and toward the track. The plucky pipe-man and his assistants were the least disturbed by the slide and advance of the earth, but they had cause for alarm, as for an instant it looked as if a large part of the bluff would be affected by the movement of that detached and would break loose to sweep everything before it to the river. During the hour, while the crowd of visitors remained, a much larger quantity of earth was washed away than was expected when the work commenced, and the officials generally seemed to be satisfied that at last an effective way of conquering the dangerous bluff had been found. It being understood that General Superintendent, J. T. Clark, was the proposer of the hydraulic method of cutting away the bluff, and that principally through his efforts it has been brought to a practical test, he was briefly interviewed. He expressed himself much pleased with the result of the experiment as far as it had gone. He added that it was only an experiment, but that it looked to him as being much more effective than blasting or shovelling, while the ultimate expense would not be half so great. Just at that moment, as if to furnish him an example to illustrate by, a blast of giant powder was fired about three hundred feet down the track by two men who had been working two hours to put it in and get it ready to fire. The quantity of dirt which came down was inconsiderable, and it did not need explanation to show that the blast only displaced the dirt, but did not move it. The advantage of the hydraulic over every other system is that the dirt is carried away as fast as washed down. The only difficulty in the way of carrying the work to a successful conclusion all along the line of the bluffs may be found in the places where the bluffs are very near the track and precipitous. The obstacle in that event is to carry away the earth as fast as it caves down. Some means of overcoming this may be found. At any rate, for the point of attack chosen at present, the hydraulic engine and the shooting stream of water seem to be about what is needed. — *Sioux City Journal.*

THE ILLUSTRATIONS.

DESIGN FOR ALL SAINTS' CATHEDRAL, ALBANY, N. Y. MR. H. H. RICHARDSON, ARCHITECT, BROOKLINE, MASS.


TOWER OF THE AUGUSTINS. TOULOUSE FRANCE

THE drawings we publish in this number were prepared in the early part of this year in competition for the proposed Episcopal Cathedral of All Saints. For this design, both in interior and exterior, effect has been sought by simplicity of form and strength of mass, for which reason the main features have been kept very simple in outline however rich the detail might be, and the window reveals have been made very deep. To obtain unity one consistent treatment has been used throughout the structure, and while its different parts have received such distinctive handling as they seemed to demand, certain strong features have been carried round the whole building, binding it together. The main entrances are by porches at the western end of the nave and at either end of the transept. These entrances are connected by vaulted cloisters, their arcades supported on clustered columns, which gives a sheltered passage from one door to another.

In view of the size of the church, and the necessity of providing free and speedy exit for large congregations, the vestibules are

made especially ample and spacious; for the same reason, as many doors as possible have been provided throughout the building.

On the left side of the western vestibule is the baptistery, a vaulted polygonal chamber somewhat more than eighteen feet in diameter, lighted by a range of pointed and traceried windows in the upper part of the wall. Corresponding with the baptistery, on the right of the western vestibule, is a wide staircase leading to the gallery over the vestibule and to the organ loft. The vestibule with the baptistery opening on the north and the staircase on the south, forms a long, continuous vista.

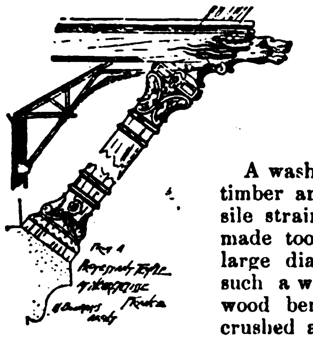
Besides the large gallery over the western vestibule, there are smaller galleries over the transept entrances, reached by spiral staircases; smaller but similar staircases at the western end lead to the towers, and to galleries in the triforium, which give access to the windows and add to the effect of the interior by their open arcades through which the windows in the main wall are seen.

The altar, standing as it does against the main wall of the apse, is practically at the end of the church. Surrounding the apse are the vestries, that of the bishop in the centre, and those for the clergy and the choir on either side in chambers, the circular form of which was suggested by the apsidal chapels of the Auvergnat churches. These chambers are entered from an ambulatory which is lighted from windows above the roofs of the vestries; the ambulatory runs around the apse inside of the vestries, and is separated from the apse by a wrought-iron screen, which gives a retired communication between the vestries, but at the same time leaves the arcades entirely open.

The chapter-house is placed near the entrance of the northern transept, and corresponding to it, near the entrance of the southern transept is a chapel.

The walls both of the clerestory and of the aisles are not very high, and the western towers are kept low to give greater value and interest to the main feature of the composition, — the great polygonal central tower which crowns and governs the whole mass.

DIMENSIONS OF ROD-ENDS, HEADS, NUTS AND WASHERS.



It is believed by the writer that the following formulæ and tables will be found to be of considerable value to architects, engineers and draughtsmen, by saving labor in computation, especially for roof and bridge trusses.

A washer, pressing against the side of a timber and serving to transmit to it the tensile strain in a wrought-iron rod, is usually made too small, especially when the rod is of large diameter, or is severely strained. If such a washer is too small, the fibres of the wood beneath it are apt to become badly crushed and injured, so that the form of the truss or other construction is changed, often increasing the original strains in the members, if not inducing new ones. The writer is not aware that the question of the proper diameter of washers has ever been fully investigated previously.

There are two general kinds or forms of bolt rod-ends.

1. Those not upset or enlarged, which are commonly found in the case of ordinary bolts or short rods.

2. Those with enlarged ends, as in the long rods of bridge and roof trusses. The object of enlarging the end before cutting the screw, is to make the end of equal strength with the part of the rod between the ends, causing a considerable saving of material and cost, if the end be enlarged in a way which injures the tensile strength of the fibres as little as possible.

I. — ENDS OF RODS NOT ENLARGED.

The screw thread is cut on the end of the rod, materially reducing the tensile strength of the rod, because this will be no greater than that of the solid core of metal left between the roots of the threads, where fracture would first occur. Consequently, that portion of the metal of the rod lying outside this core is practically lost, increasing both the weight and cost of the truss or construction. Therefore a due regard to economy indicates that these ends should be enlarged if possible, whenever the length of the rod exceeds a certain maximum.

1. *Proportions of Screw Threads.*

The standard proportions of threads recommended by the Franklin Institute have been generally adopted throughout the United States, and will therefore be employed in this article.

The number of threads per inch in length of the rod will be found in a line with the diameter of any given rod, in the tables to be given hereafter.

These threads are of V-section, the cross-section being an equilateral triangle, with a flat left on the edge and also between the roots of two adjacent threads, of one-eighth the pitch or distance between centres of two adjacent threads.

It has been thought desirable to avoid introducing any number of threads per inch not included in the original table of the Franklin Institute, consequently, the nearest and most appropriate pitch has been selected for such diameters as it has been found necessary to add to those given in the original table.

Let $n =$ number of threads per inch for the given rod. (See Tables.)

Then $\frac{1}{n} =$ pitch of threads or distance between threads.

2. *Safe Tensile Strength of Rod.*

This will be that of the core between the threads only.

Let $d =$ original diameter of rod in inches, before cutting threads.

Then $\frac{3}{8}\, n \tan. 60° = \frac{.65}{n} =$ depth of one thread.

And $d - \frac{1.3}{n} =$ diameter of solid core between threads.

Let $W =$ maximum safe tensile strength of rod in net tons.

Let $T =$ ultimate tenacity of metal of rod, in net tons per square inch of section, $= 25$ tons for wrought-iron of good quality.

Let $f =$ a factor of safety, usually $= 5$.

Then $.7854\ (d - \frac{1.3}{n})^2 =$ sectional area of the solid core.

And $W = .7854\ \frac{T}{f}\ (d - \frac{1.3}{n})^2 = 3.927\ (d - \frac{1.3}{n})^2 =$ maximum safe tensile strength of any rod, and which is the required general formula.

3. *Proportions of Heads and Nuts.*

Several different systems of proportions are in use by different manufacturers, but that of the Franklin Institute being probably the one most widely adopted, it will alone be here given.

1. *For Rough or Unpolished work.*

$1.5\, d + \frac{1}{8}$ inch $=$ width of head or nut between two parallel sides, for square or hexagonal heads or nuts.

One-half this width $=$ thickness of the head.

Thickness of nut $=$ diameter of rod.

2. *For Polished work.*

$1.5\, d\ 1\frac{1}{16}$ inch $=$ width of head or nut between two parallel sides.

$d - \frac{1}{16}$ inch $=$ thickness of nut and usually of head also.

Note. — The Franklin Institute standard nuts would frequently require to be made from bars of odd sizes, not found in stock. Therefore, the dimensions of nuts given in the following tables might be considered as the minimum safe dimensions, and in practice the next larger available stock size of bar could be substituted therefor, if desired. Nuts are now largely made by special manufacturers, each of whom has his own special proportions, usually larger than those of the Franklin Institute standard.

4. *Proportions of Washers.*

1. *Washers pressed against metallic surfaces or beams.*

In this case the ordinary wrought-iron punched washers are usually sufficient, where any washer is required. They are sold at any hardware store, and are usually a little smaller than the nut, and are from one-sixteenth to one-eighth of an inch in thickness.

2. *Washers pressed against the side of a timber.*

a. Thickness of such washers.

If made of cast-iron, as is usually the case, their thickness should be the same as the diameter of the rod.

If made of wrought-iron, half this thickness will suffice.

b. Diameter or side of washer.

Let $C' =$ ultimate resistance to crushing at right angles to the fibres of the wood, in net tons per square inch.

Let $k =$ the factor of safety for this crushing.

Let $k = 1.25$, when the maximum safe tensile strength of the rod is very seldom exerted, as in the case of the rods of roof trusses.

Let $k = 2.5$, when this maximum safe strength is frequently or permanently exerted, as in the case of bridge trusses.

The first case is embodied in the tables, in the columns headed "Temporary:" the latter, in those marked "Permanent."

Note. — The values assumed for C' are those corresponding to the pressures which would materially injure the structure of the surface of the wood, much less than those required to crush it into a shapeless form.

It is doubtless true that the safe resistance of the wood to being crushed by the washer would be somewhat increased by the resistance to shearing, which acts along the periphery of the washer, but this must be much smaller than the direct resistance of the wood to crushing, and is therefore not here considered, because the experimental data for determining its amount does not yet exist.

It is evident that the maximum tensile strain on the rod causes an equal pressure of the washer against the timber, and that this pressure must be distributed over a sufficient area, so that the wood may be in no danger of material injury.

Hence, Total area of washer $=$ Effective or bearing area required $+$ Area of hole in its center.

Let $d' =$ diameter of circular washer required.

Let $s' =$ side of a square washer required.

We have then, $.7854\ d = 3.927(d - \frac{1.3}{n})^2\ \frac{K}{C'} + .7854\ d^2$.

Reducing, $d' = \sqrt{d^2 + 5\ \frac{K}{C'}\ (d - \frac{1.3}{n})\ ^2}$, and $s' = .885\ d'$.

Which are the required general formulæ.

Let $C' = 1.16$ tons for white-oak, an average value for hard woods.

Let $C' = .40$ ton for white-pine, an average value for soft woods.

Let $k = 1.25$ for temporary, and 2.5 for permanent strains, as already explained.

Substituting these values in the general formulæ, the four following

special formulæ are obtained, by means of which the values given in the tables were calculated.

1. For washers against white-oak timbers.

Temporary strain, $d' = \sqrt{d^2 + 5.39\ (d - \frac{1.3}{n})^2}$.

Permanent strain, $d' = \sqrt{d^2 + 10.78\ (d - \frac{1.3}{n})^2}$.

2. For washers against white-pine.

Temporary strain, $d' = \sqrt{d^2 + 15.63\ (d - \frac{1.3}{n})^2}$.

Permanent strain, $d' = \sqrt{d^2 + 31.25\ (d - \frac{1.3}{n})^2}$.

For all these cases, $s' = .885\ d'$.

II.—ENDS OF RODS ENLARGED.

The ends of the rod are heated and enlarged or upset, either by forging, by pressure in dies of the proper form or by welding on a piece of larger diameter. As this process evidently destroys the parallelism of the fibres, it appears that the diameter of the solid core between the screw threads must be made somewhat greater than that of the original rod, in order to possess equal strength.

Therefore, the diameters of the enlarged ends given in the tables have been so arranged, that the diameters of the solid cores may be as nearly as possible one-sixteenth inch greater than the original diameters of the rods, for all sizes, which is probably a sufficient allowance, if the work be properly performed.

But the given diameters are to be considered as minima, and might be increased if desired, though this might require the use of a thread of a different pitch, which would make a small change in the dimensions of nuts and washers.

The length of the upset end depends on the form and nature of the parts with which it is connected; it must pass through the nut and the washer and enter the timber sufficiently to prevent any danger of sliding out of place sidewise.

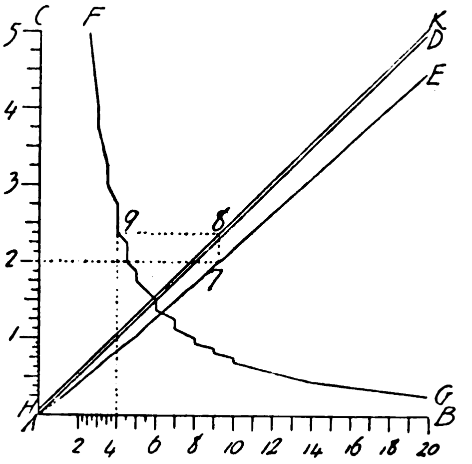
1. *Proportions of Screw Threads.*

The pitch of the thread is proportioned to the total diameter of the enlarged end, using the most appropriate standard pitch for a rod of equal diameter, with end not enlarged.

This pitch may be most conveniently found by the following graphical method.

Draw the lines A B, A C, at right angles, and lay off on A C a scale of diameters of rods, at full size; and on A A, a scale of threads to the inch, up to 20, at any convenient scale of equal parts.

Bisect the angle C A B by A D; make A H = one-sixteenth inch, and draw H K parallel to A D.



Points in the broken line F G are found by drawing a horizontal through diameter of any rod taken on A C, and a vertical through the corresponding number of threads per inch, on A B, as given for rods with ends not enlarged. The intersection of these will be a point of the line which is drawn by connecting these points as in the figure.

The broken line A E is a line giving actual diameters of solid cores between threads, for ends not enlarged. Points in A E are found by drawing a horizontal through diameter of rod on A C, and intersecting A D; then on a vertical through this intersection the solid diameter of the core is laid off from A B, giving the required point in A E. These points are then connected as shown, producing a broken and approximately curved line.

To determine the proper number of threads per inch for a rod with enlarged end:

Draw a horizontal 2-7 through diameter of the given rod, taken on A C, intersecting A E in 7; draw a vertical through 7 intersecting H K in 8, and through 8 a horizontal cutting the broken line F G in 9; lastly, a vertical through 9, which will give the required number of threads on the line A B. If this should not coincide with any standard number, the nearest standard number should be taken, to avoid introducing any irregular pitch of thread.

By means of such a diagram, the numbers of threads per inch for rods with upset ends were determined, as given in the following table for enlarged ends.

TABLE FOR RODS, ETC., WITH ENDS ENLARGED.

Diameter of Rod.	No. of Threads.	Max. safe Strain, W.	Diam. Enlarged End.	Dimensions of Nuts.				Dimensions of Washers.								Thickness of washer.	
				Rough.		Finished.		For Temporary Strains.				For Permanent Strains.					
								Against Oak.		Against Pine.		Against Oak.		Against Pine.			
				Width.	Thick.	Width.	Thick.	Side.	Diam.	Side.	Diam.	Side.	Diam.	Side.	Diam.	Cast-Iron.	Wr't-Iron.
1-4	16	.25	.39	.72	.39	.66	.33	.62	.70	.95	1.07	.81	.91	1.29	1.46	.39	.20
5-16	14	.38	.47	.83	.47	.77	.41	.77	.87	1.17	1.32	1.00	1.13	1.61	1.81	.47	.24
3-8	12	.55	.55	.95	.55	.89	.49	.91	1.03	1.40	1.58	1.29	1.35	1.92	2.17	.55	.28
7-16	11	.75	.62	1.06	.62	1.00	.56	1.05	1.19	1.63	1.84	1.39	1.56	2.23	2.52	.62	.31
1-2	11	.98	.68	1.16	.68	1.10	.62	1.19	1.35	1.85	2.09	1.58	1.78	2.55	2.88	.68	.34
9-16	10	1.24	.76	1.25	.76	1.19	.70	1.36	1.51	2.08	2.34	1.76	1.99	2.86	3.23	.76	.38
5-8	9	1.54	.83	1.38	.83	1.32	.77	1.48	1.67	2.31	2.61	1.96	2.22	3.19	3.59	.83	.42
11-16	9	1.86	.89	1.47	.89	1.41	.83	1.62	1.83	2.55	2.86	2.15	2.43	3.50	3.95	.89	.45
3-4	8	2.21	.98	1.61	.98	1.55	.92	1.77	2.00	2.78	3.12	2.36	2.65	3.82	4.31	.98	.49
13-16	8	2.59	1.04	1.66	1.04	1.60	.98	1.91	2.15	2.99	3.38	2.55	2.86	4.13	4.66	1.04	.52
7-8	7	2.97	1.12	1.81	1.12	1.75	1.06	2.05	2.31	3.21	3.62	2.72	3.07	4.42	4.99	1.12	.56
15-16	7	3.45	1.19	1.91	1.19	1.85	1.13	2.20	2.48	3.45	3.89	2.92	3.30	4.76	5.38	1.19	.60
1	7	3.93	1.25	2.00	1 25	1.94	1.19	2.34	2.64	3.67	4.15	3 03	3.51	5.08	5.73	1.25	.63
1 1-8	6	4.97	1.41	2.23	1.41	2.17	1.35	2.63	2.97	4.13	4.67	3.50	3.95	5.71	6.45	1.41	.71
1 1-4	6	6.14	1.53	2.42	1.53	2.36	1.47	2.91	3.28	4.59	5.18	3.88	4.38	6.34	7.16	1.53	.77
1 3-8	5	7.43	1.70	2.69	1.70	2.63	1.64	3.20	3.62	5.05	5.70	4.27	4.82	6.98	7.88	1.70	.85
1 1-2	5	8.84	1.82	2.88	1.82	2.82	1.76	3.48	3.93	5.56	6.27	4.65	5.25	7.69	8 68	1.82	.91
1 5-8	4 1-2	10.37	1.98	3.11	1.98	3.05	1.92	3.78	4.26	5.96	6.72	5.04	5.69	8.24	9.30	1.98	.99
1 3-4	4 1-2	12.02	2.10	3.30	2.10	3.24	2.04	4.05	4.57	6.47	7.23	5.42	6.12	8.86	10.00	2.10	1.05
1 7-8	4 1-2	13.81	2.23	3.48	2.23	3.42	2.17	4.33	4.89	6.86	7.74	5.80	6.55	9.59	10.71	2.23	1.12
2	4	15.71	2.39	3.72	2.39	3.66	2.32	4.63	5.22	7.33	8 26	6.15	6.92	10.13	11.44	2.39	1.20
2 1-8	4	17.74	2.51	3.91	2.51	3.85	2.45	4.91	5.54	7.77	8.77	6.57	7.42	10.77	12.15	2.51	1.26
2 1-4	4	19.89	2.64	4.09	2.64	4.03	2.58	5.19	5.86	8.22	9.28	6.96	7.86	11 39	12.86	2.64	1.32
2 3-8	4	22.16	2.76	4.28	2.76	4.22	2.70	5.47	6.17	8.67	9.79	7.33	8.27	12.02	13.56	2.76	1.38
2 1-2	3 1-2	24.54	2.94	4.53	2.94	4.47	2.88	5.76	6.50	9.14	10.31	7.73	8.72	13.74	15.50	2.94	1.47
2 3-4	3 1-2	29.70	3.19	4.91	3.19	4.85	3.13	6.32	7.14	10.04	11.33	8.19	9.58	13.92	15.71	3.19	1.60
3	3 1-4	35.34	3.46	5.33	3.46	5.27	3.46	6.89	7.78	10.95	12.36	9.25	10.44	15.18	17.13	3.46	1.73
3 1-4	3	41.49	3.75	5.75	3.75	5.69	3.69	7.47	8.42	11.87	13.39	10.02	11.31	16.44	18.55	3.75	1.88
3 1-2	3	48.11	4.00	6.13	4.00	6.07	3.94	8.02	9.06	12.76	14.41	10.78	12.17	17.70	19.98	4.00	2.00
3 3-4	2 7-8	55.24	4.27	6.53	4.27	6.47	4.21	8.59	9.70	13.79	15.43	11.56	13.03	18.96	21.40	4.27	2.14
4	2 3-4	62.83	4.54	6.81	4.54	6.75	4.48	9.16	10.34	14.58	16.45	12.32	13.89	20.22	22.82	4.54	2.27
4 1-4	2 5-8	70.95	4.81	7.34	4.81	7.28	4.75	9.73	10.98	15.49	17.48	13.08	14.76	21.49	24.25	4.81	2.41
4 1-2	2 1-2	79.53	5.08	7.75	5.08	7.69	5.02	10.40	11.62	16 41	18.52	13.85	15.63	22.75	25.67	5.08	2.54
4 3-4	2 1-2	88.62	5 33	8.13	5.33	8.07	5.27	10.85	12.24	17.47	19.72	14.59	16.47	24.25	27.37	5.33	2.67
5	2 3-8	98.18	5.61	8.55	5.61	8.49	5.55	11.43	12.90	18.20	20.54	15.37	17.35	25.25	28.50	5.61	2.81

If the horizontal 8-9 be produced to intersect A C, it will give the external diameter of the enlarged end before cutting threads, or this can be easily found by computation, as soon as the number of threads is determined.

2. *Safe Strength of Rod.*

Since the strength of the screw end is assumed to be equal to that of the rod, $W = .7854\ \frac{T}{f}\ d^2 = 3.927\ d^2 =$ Maximum safe tensile strength of the rod, a general formula.

3. *Proportions of Nuts.*

Heads are seldom or never used for rods of this kind, nuts at each end being much more convenient, as well as being less liable to defects in welding, etc.

The standard proportions of the Franklin Institute are employed, applying them to the external diameters of the enlarged ends.

4. *Proportions of Washers.*

1. Washers against metal.

No washers are required, if care be taken to ensure that the under surface of the nut has a good bearing on a true surface at right angles to the rod.

2. Washers pressed against timbers.

Let C' and k have the same values as for rods with ends not enlarged.

As before, Tensile strain in rod = Pressure of washer against side of the timber.

Also, Total area of washer = Its effective bearing area + Area of hole in its center.

Then the extreme diameter of enlarged end = Diameter d of the rod $+ \frac{1.3}{n} +$ one-sixteenth inch.

And diameter of hole in washer = Diameter of enlarged end.

Let d'' = diameter of round washer required.

Let s'' = side of square washer required.

We have, $.7854\, d_{''}^{2} = 3.927\, \frac{k}{C'}\, d^2 + .7854\, (d + \frac{1.3}{n} + \frac{1''}{16})^2$.

Reducing, $d'' = \sqrt{5d^2 \frac{k}{C'} + (d + \frac{1.3}{n} + \frac{1}{16})^2}$.

And $s'' = .885\, d''$.

These are the required general formulæ.

Make as before;

$C' = 1.16$ for white-oak, and $= .40$ for white-pine:

$k = 1.25$ for temporary, and $= 2.5$ for permanent strains.

We obtain the four following special formulæ, employed in the calculation of the corresponding table.

1. For washers against white-oak,

Temporary strain, $d'' = \sqrt{5.39\, d^2 + (d + \frac{1.3}{n} + \frac{1}{16})^2}$.

Permanent strain, $d'' = \sqrt{10.78\, d^2 + (d + \frac{1.3}{n} + \frac{1}{16})^2}$.

2. For washers against white-pine.

Temporary strain, $d'' = \sqrt{15.63\, d^2 + (d + \frac{1.3}{n} + \frac{1}{16})^2}$.

Permanent strain, $d'' = \sqrt{31.25\, d^2 + (d + \frac{1.3}{n} + \frac{1}{16})^2}$.

For all these cases, $s'' = .885\, d''$.

The thickness of a cast-iron washer should be equal to the diameter of the enlarged end of the rod; of a wrought-iron one, half this amount.

MODE OF USING THE TABLES.

Case 1. — *Given*, maximum working tensile strain on the rod in net tons; *required*, least safe diameter of rod, number of threads per inch, dimensions of head, nut, and washers.

Note whether the ends of the rod are to be enlarged or not, also the character of the working strain, whether "temporary" as in a roof truss, or "permanent" as in a bridge truss.

Then look in the proper table in the column headed "Maximum safe strain *W*," for the given strain, or if this be not found, for that next larger. The required diameter of the rod and dimensions of parts will be found in the same horizontal line as this strain, in the proper columns of the table.

Example 1. — Let this maximum strain = 8 net tons; "temporary," as in a roof struss; washer to bear against the side of a white-pine timber.

TABLE FOR RODS, ETC., ENDS NOT ENLARGED.

Diameter of Rod.	No. of Threads.	Max. safe strain, W.	Rough. Width of Head or Nut.	Rough. Thickness of Head.	Rough. Thickness of Nut.	Finished. Width of Head or Nut.	Finished. Thickness of Head of Nut.	Dimensions of Washers. For Temporary Strains. Against Oak. Side.	Temporary. Against Oak. Diam.	Temporary. Against Pine. Side.	Temporary. Against Pine. Diam.	For Permanent Strains. Against Oak. Side.	Permanent. Against Oak. Diam.	Permanent. Against Pine. Side.	Permanent. Against Pine. Diam.	Thickness of Washer. Cast-Iron.	Thickness of Washer. Wr't-Iron.
1-4	20	.13	.50	.25	.25	.44	.19	.44	.50	.69	.77	.58	.66	.94	1.06	.25	.13
5-16	18	.23	.59	.30	.31	.53	.25	.57	.64	.89	1.00	.75	.85	1.23	1.38	.31	.16
3-8	16	.34	.69	.34	.38	.63	.32	.69	.78	1.08	1.22	.92	1.04	1.50	1.69	.38	.19
7-16	14	.47	.78	.39	.44	.72	.38	.81	.91	1.27	1.43	1.08	1.21	1.75	1.98	.44	.22
1-2	13	.63	.88	.44	.50	.82	.42	.93	1.06	1.47	1.66	1.23	1.41	2.03	2.29	.50	.25
9-16	12	.81	.97	.48	.56	.91	.50	1.06	1.20	1.67	1.89	1.42	1.60	2.31	2.61	.56	.28
5-8	11	1.01	1.06	.53	.63	1.00	.57	1.18	1.33	1.86	2.10	1.58	1.78	2.57	2.90	.63	.32
11-16	10	1.23	1.16	.58	.69	1.10	.63	1.30	1.47	2.05	2.31	1.74	1.96	2.83	3.20	.69	.75
3-4	10	1.51	1.25	.63	.75	1.19	.69	1.44	1.62	2.27	2.56	1.92	2.17	3.14	3.55	.75	.38
13-16	9	1.77	1.34	.67	.81	1.28	.75	1.56	1.76	2.46	2.78	2.08	2.35	3.40	3.84	.81	.41
7-8	9	2.12	1.44	.72	.88	1.38	.82	1.70	1.91	2.69	3.03	2.27	2.56	3.71	4.19	.88	.44
15-16	8	2.36	1.53	.77	.94	1.47	.88	1.80	2.03	2.84	3.21	2.40	2.71	3.92	4.43	.94	.47
1	8	2.75	1.63	.81	1.00	1.57	.94	1.94	2.19	3.06	3.46	2.59	2.93	4.24	4.79	1.00	.50
1 1-8	7	3.46	1.81	.91	1.13	1.75	1.07	2.18	2.46	3.44	3.88	2.91	3.29	4.76	5.37	1.13	.57
1 1-4	7	4.45	2.00	1.00	1.25	1.94	1.19	2.45	2.77	3.89	4.39	3.29	3.71	5.39	6.08	1.25	.63
1 3-8	6	5.27	2.19	1.09	1.38	2.13	1.32	2.68	3.02	4.24	4.78	3.58	4.04	5.87	6.62	1.38	.69
1 1-2	6	6.46	2.38	1.19	1.50	2.32	1.44	2.96	3.34	4.69	5.29	3.96	4.47	6.50	7.33	1.50	.75
1 5-8	5 1-2	7.58	2.56	1.28	1.63	2.50	1.57	3.20	3.61	5.07	5.73	4.29	4.84	7.03	7.93	1.63	.82
1 3-4	5	8.72	2.75	1.38	1.75	2.69	1.69	3.40	3.88	5.45	6.15	4.61	5.20	7.54	8.51	1.75	.88
1 7-8	5	10.24	2.94	1.47	1.88	2.88	1.82	3.71	4.19	5.90	6.66	4.98	5.62	8.17	9.22	1.88	.94
2	4 1-2	11.49	3.13	1.56	2.00	3.07	1.94	3.94	4.45	6.25	7.05	5.28	5.96	8.66	9.77	2.00	1.00
2 1-8	4 1-2	13.24	3.31	1.66	2.13	3.25	2.07	4.22	4.76	6.70	7.56	5.66	6.39	9.30	10.49	2.13	1.07
2 1-4	4 1-2	15.10	3.50	1.75	2.25	3.41	2.19	4.50	5.08	7.17	8.07	6.04	6.82	9.92	11.20	2.25	1.13
2 3-8	4	16.51	3.69	1.84	2.38	3.63	2.32	4.71	5.32	7.48	8.45	6.32	7.14	10.37	11.71	2.38	1.19
2 1-2	4	18.58	3.88	1.94	2.50	3.82	2.44	5.03	5.67	7.93	8.95	6.75	7.62	11.00	12.41	2.50	1.25
2 3-4	4	23.09	4.25	2.13	2.75	4.19	2.69	5.55	6.27	8.84	9.98	7.47	8.42	12.26	13.84	2.75	1.38
3	3 1-2	27.12	4.63	2.31	3.00	4.57	2.94	6.02	6.80	9.59	10.82	8.10	9.14	13.19	15.00	3.00	1.50
3 1-4	3 1-2	32.53	5.00	2.50	3.25	4.94	3.19	6.58	7.42	10.47	11.82	8.85	9.98	14.54	16.41	3.25	1.63
3 1-2	3 1-4	37.75	5.38	2.69	3.50	5.32	3.44	7.09	8.00	11.29	12.75	9.54	10.77	15.67	17.68	3.50	1.75
3 3-4	3	43.20	5.75	2.88	3.75	5.69	3.69	7.59	8.57	12.09	13.64	10.21	11.52	16.72	18.87	3.75	1.88
4	3	49.97	6.13	3.06	4.00	6.07	3.94	8.15	9.20	12.99	14.66	10.97	12.38	18.02	20.34	4.00	2.00
4 1-4	2 7-8	56.61	6.50	3.25	4.25	6.44	4.19	8.68	9.79	13.82	15.60	11.67	13.17	19.18	21.65	4.25	2.13
4 1-2	2 3-4	63.70	6.88	3.44	4.50	6.82	4.44	9.20	10.38	14.68	16.55	12.38	13.97	20.35	22.97	4.50	2.25
4 3-4	2 5-8	71.07	7.25	3.63	4.75	7.19	4.69	9.71	10.96	15.49	17.48	13.08	14.76	21.50	24.26	4.75	2.38
5	2 1-2	78.83	7.63	3.81	5.00	7.57	4.94	10.23	11.54	16.31	18.40	13.76	15.54	22.52	25.53	5.00	2.50

1. Ends of rod not enlarged.

By Table I. we find diameter of rod = $1\frac{3}{4}$ inches; 5 threads per inch; head, $1\frac{3}{8}$ x $2\frac{3}{4}$; nut, $1\frac{3}{4}$ x $2\frac{3}{4}$; washer, $1\frac{3}{4}$ thick and $6\frac{9}{64}$ diameter.

2. Ends of rod enlarged.

By Table II. we find diameter of rod = $1\frac{1}{2}$ inches, with ends enlarged to $1\frac{53}{64}$ in diameter; 5 threads per inch; nuts at each end, $1\frac{53}{64}$ x $2\frac{7}{8}$; washer, $1\frac{53}{64}$ x $6\frac{17}{64}$ diameter.

Example 2. — Let maximum tensile strain on rod = 6 tons; "permanent," as in case of a bridge truss.

1. Ends not enlarged. Rod, $1\frac{1}{2}$ diameter; 6 threads per inch; head, $1\frac{3}{16}$ x $2\frac{3}{8}$; nut, $1\frac{1}{2}$ x $2\frac{3}{8}$; washer, $1\frac{1}{2}$ x $7\frac{21}{64}$ diameter.

2. Ends of rod enlarged. Rod, $1\frac{1}{4}$ diameter, ends enlarged to $1\frac{17}{32}$; 6 threads per inch; nuts, $1\frac{17}{32}$ x $2\frac{27}{64}$; washer, $1\frac{17}{32}$ x $7\frac{5}{32}$ diameter.

Case 2. — *Given*, diameter of the rod; *required*, its maximum safe tensile strength.

Look for the given diameter in the proper table; in the same horizontal line and in the column headed *W* will be found the required safe tensile strength in net tons.

Example 3. — A rod is $2\frac{3}{8}$ inches diameter: required its maximum safe tensile strength.

1. If ends are not enlarged, $W = 16.51$ tons.

2. If ends are enlarged, $W = 22.16$ tons.

Case 3. — *Given*, total working tensile strain on a group of similar and equal rods; *required*, diameter of each rod, dimensions of head, nut, washer, etc.

Divide the total strain by the number of rods to be used; the quotient = strain on each rod, if all are screwed up equally tight. Then proceed as for a single rod.

Example 4. — A group of rods of equal diameter is subject to a maximum tensile "permanent" strain of 50 tons; washer pressed against a white-pine timber; required the dimensions of one rod, etc.

Strain on one rod = 50 ÷ 3 = 16.67 tons.

1. Ends not enlarged. Diameter of rod, $2\frac{1}{2}$ inches; 4 threads per inch; heads, $1\frac{15}{16}$ x $3\frac{7}{8}$; washers, $2\frac{1}{2}$ x $12\frac{13}{32}$ diameter.

2. Ends enlarged. Diameter of rod, $2\frac{1}{8}$ inches; ends enlarged to $2\frac{33}{64}$ inches; 4 threads per inch; nuts, $2\frac{33}{64}$ x $3\frac{29}{32}$; washers, $2\frac{33}{64}$ x $12\frac{5}{32}$ diameter.

Case 4. — *Given*, diameter of rod and maximum tensile strain actually acting on it; *required*, the factor of safety used in this case.

The factor of safety for resistance to tensile strain employed in the given tables = 5.

Let W = maximum safe strength of the rod, as given by the proper table.

Let W' = maximum tensile strain acting on the rod.

We have $W' : W :: 5$: required factor of safety.

Or $5\, W \div W'$ = factor required.

Example 5. — A rod has a diameter of $1\frac{5}{8}$ inches and is subject to a maximum tensile strain of 15 tons; required the factor of safety used.

1. Ends not enlarged. Tabular safe strength of rod = 7.58 tons.

Therefore, $5 \times \frac{7.58}{15} = 2.53$, nearly, = factor of safety.

2. Ends enlarged. Tabular safe strength of rod = 10.37 tons.

Hence, $\frac{5 \times 10.37}{15} = 3.46$ nearly, the factor of safety used.

Case 5. — *Given*, diameter of rod; *required*, dimensions of a rectangular washer or bearing area transmitting strain in rod against the side of timber.

Find side of square washer suitable for the given case; compute

its area in square inches; dividing this by given or assumed side of rectangular area, the quotient will be its required other dimension.

Example 6. — Let the diameter of the rod = 2 inches; ends enlarged; permanent strain; pine timber. One side of rectangular area = 6 inches.

By table, 10.13 inches = side of suitable square washer; its total area = $10.13^2 = 102.6$ square inches; $102.6 \div 6 = 17.1$ inches.

The rectangular washer or area therefore is 6 x 17.1 inches.

Note. — It may sometimes be found more convenient to find the diameter of a suitable circular washer, determine its area by means of a table of circles, then computing dimensions of rectangular area as before, obtaining identical results.

Case 6. — *Given*, number and diameters of a group of equal rods; *required*, the dimensions of a single bearing piece, serving to transmit the strains in the group of rods to the sides of the timbers. This case frequently occurs at the joints of heavy trusses.

Find as before, the bearing area for one rod; multiply this by the number of rods to obtain total bearing area; the quotient of this area divided by one side of rectangular area will be its other side.

Example 7. — A group of 3 equal rods, each being 2 inches in diameter, passes through a bearing piece of 4-inch oak plank, lying across the chord, which is composed of 4 timbers, each being 6 inches thick. Required the least safe width of this bearing piece, dimensions of washers for rods, etc. Permanent strain; ends enlarged; pine timbers.

Bearing area for one rod = 102.6 square inches; for the 3 rods = $102.6 \times 3 = 307.8$ square inches.

Total bearing length of piece against top or bottom of chord = $4 \times 6 = 24$ inches.

Hence $307.8 \div 24 = 12.83$ = least width of the oak bearing piece.

By table, each rod would also have a washer 6.15 inches square or 6.92 inches in diameter, pressing against the other surface of the oak bearing piece.

If this bearing piece were made of cast or wrought iron and of sufficient thickness, no washers would be required.

Note. — In bridge trusses it is now usual to transmit the strains from diagonals to verticals directly, and *vice versa*, without causing pressure against the chords, by means of joints of peculiar form, or by cast-iron pipes, which pass through the chord and abut against the joint block and the inside of the washer. Since the pressure of the washer against the timber is greatly reduced, its dimensions may be correspondingly diminished.

A series of tables, nearly similar to the two now given, have been used in my classes for several years, and have been found to save a great deal of time in determining the dimensions of rods, and in making detail drawings for roof and bridge trusses.

APPROXIMATE FORMULÆ FOR DIMENSIONS OF WASHERS.

In case the preceding correct formulæ for the side or diameter of washers, or the tables, are not at hand, the following approximate formulæ may be of service, since they can be readily transferred into a note-book and are easily applied. The values are averaged for the range of the tables.

1. *Ends of rod not enlarged.*

Temporary strain; oak timber; side of washer = 2 diameters of rod.

Temporary strain; oak timber; diameter of washer = $2\frac{1}{4}$ diameters of rod.

Temporary strain; pine timber; side of washer = $3\frac{3}{8}$ diameters of rod.

Temporary strain; pine timber; diameter of washer = $3\frac{5}{8}$ diameters of rod.

Permanent strain; oak timber; side of washer = $2\frac{3}{4}$ diameters of rod.

Permanent strain; oak timber; diameter of washer = 3 diameters of rod.

Permanent strain; pine timber; side of washer = $4\frac{4}{9}$ diameters of rod.

Permanent strain; pine timber; diameter of washer = 5 diameters of rod.

2. *Ends of rod enlarged.*

Temporary strain; oak timber; side of washer = 2.3 diameters of rod.

Temporary strain; oak timber; diameter of washer = 2.6 diameters of rod.

Temporary strain; pine timber; side of washer = $3\frac{2}{3}$ diameters of rod.

Temporary strain; pine timber; diameter of washer = 4.1 diameters of rod.

Permanent strain; oak timber; side of washer = 3.1 diameters of rod.

Permanent strain; oak timber; diameter of washer = $3\frac{1}{2}$ diameters of rod.

Permanent strain; pine timber; side of washer = 5.1 diameters of rod.

Permanent strain; pine timber; diameter of washer = $5\frac{3}{4}$ diameters of rod.

N. Clifford Ricker.

THE PROPORTIONS OF CHURCHES.

Edinburgh, Ind., August 23, 1883.

To the Editors of the American Architect: —

Gentlemen, — Can you give the proper proportions for the heights of church ceilings, or do you know of any works that can be got that would give the proper proportions of churches and other public buildings?

Subscriber.

[Gwilt's *Encyclopædia of Architecture.* — Eds. American Architect.]

THE PUBLICATION OF PLANS.

Denver, Colo.

To the Editors of the American Architect: —

Dear Sirs, — We notice very frequently some of the prettiest designs appearing in the *American Architect* fail to have the first and second floor-plans shown; this is a mistake, we think, as the floor-plans are of as much interest as the elevation, and should have the sizes of rooms marked in figures. We think the many readers of your valuable paper would appreciate this change.

Yours respectfully, A. L. Welch.

[We entirely agree with our correspondent. — Eds. American Architect.]

BOOKS FOR BEGINNERS.

Richmond, Va., August 6, 1883.

To the Editors of the American Architect: —

Dear Sirs, — Some time ago (I think it was May 26,) I wrote asking about books for beginners. For the study of the orders you recommended Vignola or Sir William Chambers (*American Architect*, June 2, 1883). Since that time I have written to several architectural book dealers, but they told me that they had neither. Now I would like to ask (if it is not too much trouble to you) where I can obtain them, and what are the prices.

By letting me know you will greatly oblige,

Yours respectfully, Wm. G. Notting.

[Write directly to Garnier Frères, No. 6, Rue des Saints-Pères, Paris, France, for a copy of Leveil's Vignola, enclosing an international money order for ten francs, which will cost you about \$2.15, and you will receive the book by mail in about four weeks. On its arrival at the post-office you will be notified to come and pay the duty, amounting to about fifty cents, and on doing so the book will be delivered to you. The books of Sir William Chambers are much more expensive than this, and are, so far as we know, out of print, but you can get second-hand copies, at various prices, from B. T. Batsford, 52 High Holborn, London, England. You should write him first asking prices, and then remit international money order for the amount, with postage, which he will tell you the cost of. Duty, if any is charged, will be payable at the post-office on delivery.—Eds. American Architect.]

NOTES AND CLIPPINGS.

A Double Artesian Well.— Selma has the most wonderful artesian well in the world. Two separate streams of water of entirely different properties flow from this well. This effect is produced by the insertion of a two inch pipe within a four-inch tube. The larger pipe descends four hundred feet; the water has no mineral qualities, and is very cold. The inner pipe descends seven hundred feet; the water is strongly impregnated with sulphur and iron, and, compared with the temperature of the twin stream, is quite warm.— *Selma (Ala.) Times.*

Induration of Soft Limestone with Fluosilicates. — The use hitherto made of alkaline silicates to harden limestones is far from satisfactory; it leaves the stone impregnated with soluble salts which are only expelled after long exposure to rain. These salts of potassa and soda rapidly nitrify, and assist the growth of fungous bodies for which the potassa salt is a manure. Another mischievous consequence, resulting from this process, is the formation of an enamel impermeable to water upon the surface of the stones which have reached a point of saturation with the alkaline wash, and this enamel upon the arrival of frost imprisons the water, which freezing underneath this obstinate varnish forcibly detaches the glassy coating and breaks and injures the underlying surface. M. L. Kessler has apparently succeeded in replacing this induration bath by a solution of fluosilicates of bases whose oxides and carbonates are insoluble in a free state. When soft limestone is saturated with a concentrated solution of a fluosilicate of magnesium, aluminum, zinc, or lead, a degree of induration is soon reached which is very considerable. In fact, except the liberated carbonic anhydride there is formed only fluorspar, silica, aluminic oxide, and carbonates of zinc and lead, or fluoride of magnesium, all of which are less soluble than the limestone itself. No varnish is formed and therefore no danger threatened from the expansion of frost underneath it. The process has perfectly resisted the severe tests of winter, and this method of silification is only slightly more expensive than the old process it is intended to replace. It possesses unexpected advantages. It is frequently valuable to give to the surfaces of soft limestones the appearance and the polish of the hard marbles, if only to avoid the settlement of dust and soot upon their rough surfaces. In order to smooth and polish the coarsest limestone it answers to coat it with a paste made of the pulverized stone and water, and after drying to impregnate it with fluosilicate chosen for its lapidification. It forms a homogeneous body finely granular in texture, and as hard and refractory as the stone itself. It is only necessary to take some very simple precautions to avert the carrying away of fine dust in the beginning of the operation, caused by the rapid disengagement of carbonic anhydride. The skill in its application consists in flowing the solution in a thin film over a surface sufficiently dried. When a coloring substance insoluble in water is mixed with the paste, a very variable and interesting series of decorative effects are secured. Finally, by employing colored fluosilicates, as those of copper, chromium, iron, etc., the limestone is colored even in its interior by the formation of insoluble compounds. These colors follow the intimate construction of the stone and afford designs of considerable beauty.—*Les Mondes.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

283,105. FLUSHING-TANK FOR WATER-CLOSETS, URINALS, ETC. — Thos. Henderson, Nashville, Tenn.

283,110. ELEVATOR SAFETY-CATCH. — Alexander C. Hope, Cartersville, Ind.

283,125. LOCK. — Chas. A. Ludlow, Bridgeport, Conn.

283,126. ROOFING-TILE. — Wilhelm Ludowici, Ludwigshafen-on-the-Rhine, Germany.

283,128. LOCK-HINGE. — Egbert E. Masters, Woodland, Cal.

283,133. FIRE-PROOF LINING FOR BOXES, SAFES, DOORS, SHUTTERS, VAULTS, ETC. — Luke H. Miller, Baltimore, Md.

283,134. KNOB-ATTACHMENT. — William N. Mills, Truro, Nova Scotia, Canada.

283,148. VENTILATING AND APPARATUS THEREFOR. — Thomas Rowan, London, England.

283,149. WARMING AND VENTILATING AND APPARATUS THEREFOR. — Thomas Rowan, London, Eng.

283,158. FIRE-ESCAPE. — Peter Smith, Cato, Kans.

283,159. FIRE-ESCAPE. — Chas. F. Spencer, Rochester, N. Y.

283,163. FIRE-ESCAPE. — Jeremiah Stever, Bridgeport, Conn.

283,163. PIPE-TONGS. — Daniel E. Stewart, Guyandotte, W. Va.

283,166. INSULATED METALLIC ROOF. — Henry C. Thomas, Rock View, N. Y.

283,172. WATER-CLOSET.—Richard Walsh, Detroit, Mich.

283,184. BRICK-MACHINE. — William Woodward and Abel B. Woodward, Nashville, Tenn.

283,196. FIRE-EXTINGUISHER. — John W. Bishop, New Haven, Conn.

283,203. CANT-HOOK. — Jesse Carpenter, Wyman, Mich.

283,208. DOOR-HANGER. — William Brown Cogger and Henry A. Hamlin, Minneapolis, Minn.

283,214. BUILDERS' SCAFFOLD OR MORTAR-BOARD. —Samuel Dale, Boonesborough, Iowa.

283,223. NAIL-PULLER. — Marvin D. Edgerton, Bristol, Conn.

283,268. LATCH. — Eugene M. Mix and James E. Mix, Buffalo, N. Y.

283,277. HINGE. — Alonzo L. Porter, Chicago, Ill.

283,279. DOOR-HANGER. — Edwin Prescott, Arlington, Mass.

283,291. ROOFING-MACHINE. — Robert C. Snowden, Elizabeth, Pa.

283,300. HYDRAULIC PILE-DRIVER. — Joseph W. Surprenant and James E. Ferguson, Astoria, Oreg.

283,319. BEVEL ATTACHMENT FOR HAND-SAWS. — Emanuel Andrews, Williamsport, Pa.

283,332. SKYLIGHT. — John Ehrhardt, St. Louis, Mo.

283,345. FIRE-PROOF BUILDING. — Philipp G. Hubert, New York, N. Y.

283,357. RATCHET-WRENCH. — John Williams Pruitt, Russellville, Ark.

283,358. MANUFACTURE OF ARTIFICIAL STONE. — Harriott H. Ravenel, Charleston, S. C.

283,365. SASH-FASTENER. — Frederick Dudley, Eugene City, Oreg.

283,366. BRICK-MACHINE. — James C. Anderson, Highland Park, Ill.

283,372. MACHINE FOR MAKING BLIND-SLATS. — Joseph W. Brainard, Kent, O.

283,375. FLOORING. — Amand J. B. A. Chatain, New York, N. Y.

283,378. PIPE-WRENCH. — Geo. W. Cook, Chicago, Ill.

283,379. HAMMER. — Geo. W. Cook, Chicago, Ill.

283,380. KNOB. — Geo. Cooper, Greenwood Iron Works, N. Y.

283,384. SASH-FOLLOWER. — John J. Dwyer, New York, N. Y.

283,391. FIRE-ESCAPE. — Joseph Hart, New York, N. Y.

283,393. SAW-FILING MACHINE. — Charles F. Hill, Phelps, N. Y.

283,404. WEATHER-BOARD GAUGE. — Jesse M. Keith, Maiden Rock, and Simeon R. Bolton, Trim Belle, Wis.

283,431. ELEVATOR. — Wilson R. Smith, Beloit, Wis.

283,439. FIRE-ESCAPE. — William Torst, Bingham Cañon, Utah.

283,449. HEATING-APPARATUS. — Robert Tungfer, Görlitz, Prussia, Germany.

283,460. PORTABLE SASH-SECURER. — Reinhold Bettermann, Cambria, Pa.

283,473. DRILL-STOCK. — Louis Eicke, New York, N. Y.

283,502. FASTENER FOR THE MEETING-RAILS OF SASHES. — Philip Mathes, Idlewood, Pa.

283,517. VAULT-COVER FASTENING. — Christian Hansen Ross, Chicago, Ill.

283,530. FIRE-ESCAPE LADDER. — Geo. A. Swartz, Orangeville, Ill.

283,564. RIGHT-ANGLED LEVEL.—Bozwell B. Butt, Richmond, Va.

283,565. BRICK-PRESSING MACHINE. — George Carnell, Philadelphia, Pa.

283,575. SOLDERING-IRON. — Jas. C. Covert, West Troy, N. Y.

283,580. MECHANISM FOR RAISING LINES TO THE UPPER PARTS OF BUILDINGS. — Geo. O. Daw, New York, N. Y.

283,595. ORNAMENTING SURFACES OF WALLS, CEILINGS, PAPER-HANGINGS, ETC. — Gustave Giersberg and Richard Wirth, New York, N. Y.

283,601. DOOR-HINGE.—Heinrich Haltaufderheide, Cassel, Prussia, Germany.

283,603. MANUFACTURE OF ARTIFICIAL STONE AND ARTIFICIAL EMERY.—Bernhard Hess, Baireuth, Bavaria, Germany.

283,617. FIRE-ESCAPE. — Handley B. Kimball and Cornelius S. Barrett, Charlotte, Mich.

283,620. FIRE-ESCAPE. — Henry A. Lee, New York, N. Y.

283,637. HEATING, COOLING AND VENTILATING APPARATUS.— Isaac N. Mills, Dover, Del.

283,649. BLIND AND DOOR SPRING. — Patrick K. O'Lally, Boston, Mass.

283,650. FIRE-ESCAPE.—Madison M. Ormsby, David City, Neb.

283,654. FIRE-ESCAPE LADDER. — Alois Peteler, New Dorp, N. Y.

283,655. HOD-ELEVATOR. — Franklin Pierce, New York, N. Y.

283,658. DOOR-CHECK. — Stephen Porter, Boston, Mass.

283,660. COMPRESSION-COCK. — Charles C. Reed, Worcester, Mass.

283,666. FIRE-ESCAPE. — Edward T. Rowe, Boston, Mass.

283,675. WRENCH. — William J. Sherman, St. Augustine, Fla.

283,685. LATHE FOR DRESSING STONE. — Frank Trier, London, Eng.

283,696. WRENCH. — John J. Brandt, De Witt Centre, N. Y.

283,699. STATIONARY WASH-STAND. — Patrick Connolly, Brooklyn, N. Y.

283,702. FIRE-ESCAPE. — Horace D'B. Cutler, Glenwood, Mo.

283,705. BORING-BIT. — Hiram E. Fuller, New York, N. Y.

283,718. KNOB-ATTACHMENT. — John B. Morris, Cincinnati, O.

SUMMARY OF THE WEEK.

Baltimore.

HOUSES. — Thomas Dixon, architect, has prepared drawings for Lewis H. Robinson, builder, for nine houses, six of which will front on Park Ave., each 18′ 3″ x 50′; two on Park Pl., 28′ x 51′ and 31′ x 56′ 2″ respectively, and one on North Ave., 21′ 10″ x 58′ 3″ (a store and dwell). They will be built of brick, with marble and terra-cotta finish, and cost about $32,000.

BUILDING PERMITS. — Since our last report twenty-seven permits have been granted, the more important of which are the following: —

W. F. Stubs, 7 two-st'y brick buildings, n s Pratt St., commencing n e cor. Pulaski St.

Henry Westphal, 3 two-st'y brick buildings, w s Fulton St., n of Eagle St.

Dr. G. Reuling, three-st'y brick building, in rear of 79 Monument St., s s, between Cathedral St. and Park Ave.

J. D. Mason, four-st'y brick back building, rear 141 Pratt St., s s, between Charles and Light Sts.

John Kearn, Jr., & Co., one-st'y brick foundry, 77′ x 81′, in rear of s w cor. Cross and Wicomico Sts.

L. W. Counselman, three-st'y brick building, w s Broadway, between McElderry and Jefferson Sts.

Calvary Baptist Church, stone church and two-st'y brick parsonage, n w cor. Howard St. and Park Ave.

D. D. Mallory, 2 two-st'y and mansard roof brick buildings, n w cor. Eutaw and Robert Sts.

Baltimore Sheep Butchers' Association, two-st'y brick stable, e s Pennsylvania Ave., between Robert and Laurens Sts.

James A. Wilson, four-st'y brick building, w s Eutaw St., between Lexington and Saratoga Sts.

The labor market report for the month of September remains the same as for August.

Boston.

STORES. — The old buildings at 18 and 20 Beacon St., formerly occupied by the Boston University, have been torn down and the foundation for a new building started. It will have a freestone front, six stories high, measures on the ground 41′ x 84′, and will be occupied as stores and offices; Mr. Wm. G. Preston, of Boston, is the architect; Leander Greely & J. P. Lovering are the contractors; cost, about $50,000.

BUILDING PERMITS. — *Brick.* — *Tremont St., No.* 1037, Ward 19, V. W. Rivinius, dwell. and store, 14′ x 20′, two-st'y flat.

Shawmut Ave., cor. Madison St., Ward 19, Nathan Cushing, trustee, tenement, 40′ x 74′, four-st'y flat; Robert R. Mayers.

Westland Ave., cor. Falmouth St., Ward 22, Albert D. Kilham, family hotel, 44′ x 91′ x 145′, five-st'y flat; C. P. Soule.

Wood. — *Shirley St.*, n w s, near George St., Ward 20, William Donaldson, dwell., 14′ x 16′ and 20′ x 28′, two-st'y pitch; Wm. Donaldson.

Mansfield St., Ward 25, Moses A. Rice, dwell., 14′ x 18′ and 26′ x 30′, two-st'y pitch; John McNamara.

Union Ave., near Green St., Ward 23, Maria Roan, dwell., 28′ x 34′ 9″, two-st'y pitch.

Chelsea St., No. 129, Ward 3, Patrick C. Neary, dwell. and store, 25′ 6″ x 30′, four-st'y flat; John Hayes.

Chelsea St., No. 127, cor. Tremont St., No. 911, Ward 3, Patrick C. Neary, dwell. and store, 25′ 6″ x 30′, four-st'y flat; John Hayes.

East First St., Nos. 384–390, Ward 14, H. A. Lewis, protection to kiln, 44′ x 44′, one-st'y pitch; H. A. Lewis.

Washington St., near Walk Hill St., Ward 23, John J. Murray, stable, 40′ x 50′, two-st'y pitch; Thomas Congley.

Dorchester Ave., cor. Jackson St., Ward 15, C. H. Daloh, dwell. and storage, 20′ and 47′ x 80′, two-st'y flat; Ira A. Medbury.

Centre St., near Lamartine St., Ward 23, George Pecker, dwell., 24′ x 30′, three-st'y flat; J. L. Dakin.

A St., near New Congress St., Ward 13, Boston Wharf Corporation, manufactory, 40′ x 100′, two-st'y flat; G. G. Older.

Fuller St., near Milton Ave., Ward 24, Horace W. French, dwell., 10′ x 14′ and 24′ x 29′, two-st'y pitch; Sam. Rantin.

Dudley Ave., cor. Washington St., Ward 23, James H. Atwood, dwell., 18′ x 19′, and 20′ and 23′ x 32′, two st'y pitch.

Grigg St., junction Allston St., Ward 25, Chas. H. Brown, dwell., 14′ x 23′ and 20′ x 32′, two-st'y pitch; H. M. Peavy.

Grigg St., junction Allston St., Ward 25, Chas. H. Brown, 20′ x 30′ and 14′ x 23′, two-st'y pitch; H. M. Peavy.

Allston St., junction Grigg St., Ward 25, C. H. Brown, dwell., 20′ x 30′ and 14′ x 23′, two-st'y pitch; H. M. Peavy.

Allston St., junction Grigg St., Ward 25, Chas. H. Brown, dwell., 20′ x 22′ and 14′ x 23′; H. M. Peavy.

Water St., No. 77, opposite Foss St., Ward 5, Hoosac Tunnel Dock & Elevator Company, storage freight, 72′ x 84′ and 80′ 6″ x 84′, one-st'y flat; H. W. Ball.

Brooklyn.

BUILDING PERMITS. — *Park Pl., Nos.* 22 *to* 32, s s, 100′ w Beaver St., 5 two-st'y frame flats, tin roofs; cost, each, $3,200; owner, Henry Minck, 43 Beaver St.; architect, T. Engelhardt.

Myrtle St., n e cor. Charles Pl., three-st'y brick store and tenement, tin roof; cost, $4,200; owner, John S. Hays; architect, T. Engelhardt.

Maujer St., n s, 275′ w Morgan Ave., two-st'y brick storehouse, gravel roof; cost, $8,000; owner and architect, Wm. Brookfield, 516 Madison Ave., New York City; builder, J. Bisom.

Clifton Pl., No. 227, three-st'y brick tenement, tin roof; cost, $5,000; owner and builder, D. Boyl, 225 Clinton Pl.; architect, M. J. Morrill; mason, not selected.

Broadway, No. 692, w s, 50′ n Lewis Ave., three-st'y frame store and dwell., tin roof; cost, $4,000; owner, Chas. Scholl, 28 Sumner Ave.; architect, T. Engelhardt; builder, J. Rueger.

Park Ave., Nos. 663 *to* 669, 100′ e Marcy Ave., 4 three-st'y frame double tenements, tin roofs; cost, each, $4,200; owner, Fred. Miller; architect, T. Engelhardt; builders, G. Lehrian & Sons.

Ninth Ave., e s, 213′ s Braxton St., three-st'y and attic brick dwell., mansard and tin roof; cost, $6,000; owner, Thomas L. O'Reilly, 515 Prospect Ave.; architect, C. Byrne; builders, M. Ryan and P. Murphy.

Rutledge St., s s, 100′ w Bedford Ave., 6 two-st'y brownstone front dwells., tin roofs; cost, each, $4,000; owner and builder, Richard Healey; architect, I. D. Reynolds.

Floyd St., n s, 236′ e Marcy Ave., two-st'y frame tenement, tin roof; cost, $3,500; owner, —— Bayer, 195 Floyd St.; architect and builder, H. Loeffler.

Hopkins St., s e cor. Delmonico Pl., three-st'y frame double tenement, tin roof; cost, $4,000; owner, architect and builder, Henry Loeffler, 189 a, Stockton St.

Madison St., s s, 300′ e Tompkins Ave., 5 two-st'y brownstone front dwells., tin roofs; cost, each, $5,000; owner, architect and builder, Jas. A. Thompson, 300 Lexington Ave.

Leonard St., No. 43, w s, 180′ s Nassau Ave., three-st'y tenement, tin roof; cost, $3,200; owner, Evangelical Association, Greenpoint; architects, R. Van Lehn; builders, Bryden & Shiler.

Central Ave., No. 64, n s, 75′ n Melrose St., three-st'y frame store and tenement, tin roof; cost, $4,200; owner, Michael Rausch, 45½ Wilson St.; architect, T. Engelhardt; builders, W. Bayer and D. Kreuder.

Atlantic Ave., s s, 200′ e Rockaway Ave., 2 three-st'y frame dwells., gravel roofs; cost, $6,700; owner and builder, D. C. Davidson, 125 Sumner Ave.

Marcy Ave., Nos. 132 *to* 136, w s, 76′ n Heyward St., 4 two-st'y and basement brick dwells., tin roofs; cost, each, $5,000; owner and builder, Henry Grassman, 807 Willoughby Ave.; architect, T. Engelhardt.

Marcy Ave., n w cor. Hayward St., three-st'y brick store and dwell. tin roof; cost, $6,000; owner, etc., same as last.

Hancock St., n s, 475′ e Reid Ave., 5 two-st'y brownstone front gravel roofs; cost, each, $4,500; owner, D. B. Algie, 881 Tenth Ave., New York City; architect, J. E. Styles; builders, Algie & Son.

Third Pl., n s, 20′ e Henry St., 4 two-st'y and basement brownstone front dwells., tin roofs; cost, each, $4,000; owner and builder, Alfred Williams, 39 Fourth Pl.; architect, W. H. Wirth; mason, W. Rountree.

Third Pl., n e cor. Henry St., three-st'y and basement brownstone front dwell., mansard roof slated, deck roof tinned; cost, $5,000; owner, etc., same as last.

John St., n s, 115′ e Jay St., six-st'y brick warehouse, gravel roof; cost, $40,000; owners, Chas. and John Arbuckle, foot of Adams St.; architect and builder, F. D. Norris.

Calyer St., s e cor. West St., three-st'y brick office-building, gravel roof; cost, $21,000; owner, T. F. Rowland, on premises; architect, R. B. Eastman; builder, T. Rutan.

Park Ave., No. 685, n s, 400′ e Marcy Ave., three-st'y frame store and double tenement, tin roof; cost, $4,000; owners and builders, Eich Bros., 762 Park Ave.; architect, T. Engelhardt; mason, J. Fuchs.

Court St., w s, 200′ n Degraw St., four-st'y brick tenement, tin roof; cost, $7,000; owner, H. W. Stearns, 292 Court St.; architect, T. H. Houghton.

ALTERATIONS. — *Harrison St.*, n w cor. Clinton St., two-st'y brick extension, tin roof; cost, $5,755; owner, John Byrne, on premises; architects and builders, M. Freeman's Sons; masons, Burnes & McCann.

Albany Ave., s e cor. Herkimer St., four-st'y and basement brick extension, tin and slate roof; cost, $13,000; owner, Church Charity Foundation, of Long Island, Albany Ave., cor. Atlantic Ave.; architect, M. J. Morrill; builders, J. Ashfield & Son and Martin & Lee.

Buffalo, N. Y.

Building Permits.—Five-st'y brick fire-proof building, brownstone and terra-cotta ornament, for Commercial and Advertiser, cor. Washington and North Division Sts.; cost, $75,000; architect, R. A. Waite.

Brick fire-proof building, for Board of Trade, cor. of Seneca and Pearl Sts.; cost, $120,000; architect, M. E. Beebe.

Five-st'y brick addition to the factory of Lielney, Shepard & Co., Clinton St.

Brick and stone house, for Mrs. E. F. Metcalfe, North St.; cost, $22,000; architects, McKim, Mead & White, New York, N. Y.

House for H. W. Gorton, Seventh St., brick, with brownstone; cost, $13,500; architect, James G. Cutler.

Repairs to the building of Messrs. Miller & Greener, cor. of North Division and Washington Sts.; cost, $28,000; M. E. Beebe, architect.

Chicago.

Houses. — Architect J. C. Lane has plans completed for 6 three-st'y dwells., with stores below, for Mr. A. S. Wood, on West Madison St., at cost of $35,000.

Furst & Rudolph are architects for the three-st'y dwell. and store on Desplanes St., for C. F. Bland, to cost $10,000.

Wm. Ruehl is the architect for the four-st'y dwell. and store to be built on Twelfth St., for Wm. Cahill, to cost $8,000.

W. L. Carl is architect for 2 two-st'y dwells., to be built on Oak Street for B. F. Norris, to cost $11,000.

Plans have been completed for William Strippleman, for two-st'y dwell. on South Robey St., for C. W. Spronk, to cost $7,000.

Flats. — Plans are ready by H. Gierks, architect, for 2 three-st'y flats and stores below, to be built cor. Wood St. and Chicago Ave., for C. Klergel, to cost $15,000.

Stores. — Plans are completed by Furst & Rudolph for 2 four-st'y stores on Waldo St., for J. & H. Beidler; cost, $20,000.

Building Permits. — N. Dubach, two-st'y dwell., 2807 Fifth Ave.; cost, $4,000.

Samuel F. Hunt, two-st'y dwell., 925 West Polk St.; cost, $3,000.

Peter Klein, two-st'y dwell., 554 Larrabee St.; cost, $3,500.

C. Klergel, 2 three-st'y and basement store and flats, Wood St., cor. Chicago Ave.; cost, $15,000; architect, H. Gierks; builder, Fred Hanson.

S. P. Parmly, 4 two-st'y and basement stores and dwells., 129-135 West Van Buren St.; cost, $10,000; architect, F. L. Charnly.

L. G. Fisher, 2 stores, Third Ave., cor. Van Buren St.; cost, $10,000; architect, F. L. Charnly.

Christ Reformed Episcopal Church, addition and tower, Twenty-fourth St., cor. Michigan Ave.; cost, $20,000.

J. H. Schnoor, two-st'y flats, 378 Dayton St.; cost, $3,500.

Wm. Cahill, four-st'y and basement store and dwell., 217 Twelfth St.; cost, $8,000; architect, Wm. Ruehl; builders, Krug & Demuth.

W. J. Anderson, 3 cottages, 17-21 Courtland St.; cost, $3,000.

N. M. Freer, 3 stores, 50-58 West Adams St.; cost, $6,000.

Grace Lutheran Church, church, Chicago Ave., cor. Franklin St.; cost, $12,000.

S. E. Gross, 10 cottages, cor. Honora and Thirty-ninth Sts.; cost, $11,000.

P. Humiston, 3 three-st'y and basement stores and dwells., 665 and 667 West Lake St.; cost, $12,000; architect, O. H. Placey.

M. G. Collson, three-st'y and basement store and dwell., 235 Western Ave.; cost, $6,000; architect, O. H. Placey; builders, Oliver & Hill.

C. F. Bland, three-st'y and basement dwell. and store, 245 South Desplanes St.; cost, $10,000; architects, Furst & Rudolph; builders, Mueller & Schul.

J. & H. Beidler, 2 four-st'y stores, 52-64 Waldo St.; cost, $20,000; architects, Furst & Rudolph; builders, Mueller & Schul.

Brunswick & Balke Co., lumber-dryer, 89 and 91 Huron St.; cost, $3,500; architects, Adler & Sullivan.

R. Slater, two-st'y dwell., 12 Eagle St.; cost, $3,500; architect, Wm. H. Drake; builders, N. P. Loberg & Co.

A. S. Wood, 6 three-st'y stores and dwells., 837-847 Madison St.; cost, $35,000; architect, J. C. Lane; builder, A. R. Shannon.

C. Gisecke, two-st'y and basement dwell., 519 and 521 West Erie St.; cost, $4,500.

James Krisek, two-st'y and basement dwell., 830 Allport Ave.; cost, $3,000; architect, Joseph Wittner; builder, Matt Holek.

James Hodan, two-st'y and basement dwell., 535 West Twentieth St.; cost, $4,000; architect, J. Widner; builder, Matt Holek.

Buchan & Gill, 2 two-st'y dwells., 702 West Chicago St.; cost, $10,000.

Albert Crane, 6 cottages, Emerald Ave., near Twenty-eighth St.; cost, $6,000.

L. S. Dobbins, 4 cottages, Low Ave., near Twenty-ninth St.; cost, $4,000.

Ferd. Wistardl, brick basement, 44 Hobbin St.; cost, $3,000.

J. Kauttoff, two-st'y store and dwell., 299 Lincoln St.; cost, $3,000.

Chicago Steel Works, foundry and machine-shop, Noble St., cor. North Ave.; cost, $6,500.

B. F. Morris, 2 two-st'y and attic dwells., 417 and 419 Oak St.; cost, $11,000; architect, W. L. Carl; builder, B. G. Robinson.

Turney & Bond, 6 cottages, Butler St.; cost, $6,000.

N. S. Davis, three-st'y addition, 291 Huron St.; cost, $4,000.

E. J. Loveland, two-st'y and basement dwell., 2835 Calumet Ave.; cost, $4,500; architects, Dixon & Townsend; builder, E. J. Loveland.

Jno. Mittel, two-st'y and basement dwell., 284 North Ave.; cost, $4,000.

C. W. Spronk, two-st'y and cellar dwell., 238 South Robey St.; cost, $7,000; architect, Wm. Strippleman; builders, Wilkie & Halman.

Reunion Presbyterian Church, two-st'y church, 615 and 617 South Ashland Ave.; cost, $10,000.

A. T. Ewing, 4 cottages, 614-624 Thirteenth St.; cost, $4,000.

Cincinnati.

Building Permits. — Henry Kister, brick chapel, s s Baum St., near Lock St.; cost, $15,000.

A. D. Bullock & Co., four-st'y brick building, Lick St., near Pike St.; cost, $4,500.

John Ryan, three-st'y brick building, Gilbert Ave.; cost, $4,500.

Posey & Hartman, two-st'y brick building, n e cor. Eighth St. and Depot St.; cost, $3,500.

S. Haffel, two-st'y brick building, Summit Ave.; cost, $3,500.

Wiltstach & Dalton, four-st'y brick building: cost, $10,000.

Chas. Boltzen, 2 two-st'y brick buildings, s w cor. Lingo and Langland Sts.

Jno. Lackman, three-st'y brick building, Colerain Pike; cost, $8,000.

Repairs; cost, $10,975.

New York.

Labor. — There continues to be trouble with the unions of the building trades. The "bosses" are beginning to get restive under the continued interference with their business, and it is probable that an amalgamated effort will soon be made by them to stop the annoyance.

Apartment-Houses. — For the Cary Estate, a five-st'y apartment-house, 40' x 40', brick, stone and iron, is to be built from designs of Mr. Hugo Kafka, at Nos. 63 and 65 Vesey St.

For Mr. George Miller, a five-st'y brownstone apartment-house, 25' x 85', is to be built on the north side of Eighty-eighth St., between Friend and Third Aves., from designs of Mr. John Brandt, at a cost of about $20,000.

Building Permits. — *Greenwich St., Nos.* 430, 432, 434 *and* 436, seven-st'y brick factory, tin roof; cost, $50,000; owner, James Pyle, 215 West Forty-fifth St.; architect, Thos. R. Jackson.

One Hundred and Forty-seventh St., s w cor. Willis Ave., 2 three-st'y frame tenements, tin roofs; cost, $3,000 and $6,000; owner, Gepke Shulte, 11 First Ave.; architect, Adolph Pfeiffer; builder, not selected.

Seventy-first St., n s, 20' w Ninth Ave., 5 three-st'y brownstone front dwells., tin roofs; cost, $12,000; owner, John M. Ruck, 910 Ninth Ave.; architects, Thom & Wilson.

Seventy-second St., s s, 100' e Tenth Ave., 5 four-st'y brownstone front dwells.; cost, total, $130,000; owner, Geo. J. Hamilton, 2078 Fifth Ave.; architects, Thom & Wilson.

Suburban St., s s, 80' w Decatur Ave., 5 two-st'y frame dwells., shingle roofs; cost, $2,700; owner, Chas. R. Hadden.

West Broadway, s w cor. York St., four-st'y brick store, fire-proof roof; owner, M. B. Baer, 72 West Thirty-fourth St.; architect, Jos. M. Dunn; builders, F. & W. E. Bloodgood and Wm. Arnold.

Ogden Ave., w s, 175' s Union St., three-st'y frame tenement, tin roof, cost, $5,000; owner, E. Ketchum, Jerome Ave., near One Hundred and Sixty-fifth St.; architect, J. B. Jennings; builders, W. J. Hargrave and A. McNally.

Courtland Ave., w s, 25' n One Hundred and Forty-ninth St., three-st'y dwell., tin roof; cost, $4,500; owner, Adam Janson, 635 One Hundred and Fifty-third St.; builders, Handwerker & Wagner and Janson & Jaeger.

West St., No. 494, four-st'y brick tenement and store, metal roof; cost, $8,000; lessee, P. Malone, 368 West Twenty-third St.; architect, And. Craig; builders, Drummond & Jones.

Ninth Ave., n w cor. Seventy-first St., four-st'y brownstone front flat and store, tin roof; cost, $20,000; owner, John M. Ruck, 910 Ninth Ave.; architects, Thom & Wilson.

Ninth Ave., w s, 60' 2" n Seventy-first St., 2 four-st'y brownstone front dwells., tin roofs; cost, $10,000; owner and architects, same as last.

West One Hundred and Nineteenth St., No. 454, four-st'y brick tenement, tin roof; cost, $12,250; owner, Mary Martin, 126 West Fiftieth St.; architects, Bettinger & Lange; builders, Dawson & Archer and W. H. Glover.

Fifty-first St., n s, 100' w First Ave., 2 five-st'y brownstone front tenements, tin roofs; cost, $18,000; owner, John S. Johnston, 14 East One Hundred and Twenty-ninth St.; architect, John Brandt.

One Hundred and Twenty-ninth St., n s, 110' e Madison Ave., five-st'y brownstone front tenement, tin roof; cost, $18,000; owner, Wm. Hughes, 52 East One Hundred and Thirtieth St.; architect, John McIntyre; masons, Shannon & Stewart.

East One Hundred and Fourteenth St., No. 124, four-st'y brick tenement, tin roof; cost, $15,000; owner, John Lalor, East One Hundred and Twelfth St.; architect, A. Spence.

Third Ave., n w cor. One Hundred and Fifty-fourth St., three-st'y frame tenement and store, on n s, and s s, tin roof; cost, $4,500; owner, Henry Gerken, Third Ave. and One Hundred and Fifty-third St.; architect, S. Baker; builders, Eheman and Wm. Kusche.

Alterations. — *West Thirty-seventh St., No.* 407, two-st'y brick extension; cost, $5,000; owner, Westing & Hofers, 403 West Thirty-seventh St.; architects, Lederle & Co.; builders, Fepler & Wolforth.

Grand St., No. 263, two-st'y brick extension, tin roof; cost, $3,000; owner, J. T. Maguire, on premises; architect, Jos. M. Dunn; builder, not selected.

Fifth Ave., Nos. 220 *and* 222, internal alterations; cost, $4,000; lessee, Wood Gibson, 1 West Forty-fifth St.; builders, N. & H. Andrews and A. C. Hoe & Co.

Clinton Pl., No. 44, rear, two-st'y brick extension; cost, $3,000; owner, Edward N. Tailor, 11 North Washington St.; architect, Richard Berger; builders, E. D. Connolly & Son and Henry D. Powers.

West Fifty-seventh St., Nos. 518 *and* 520, internal alterations; cost, $3,000; owner, Conrad Stein, 521 West Fifty-seventh St.; architect, J. Kastner.

East Fifty-seventh St., No. 441, one-st'y brick extension and bay window on rear; cost, $4,000; owner, Peter Doelger, 405 East Fifty-fifth St.; architect, J. Kastner.

Courtlandt St., No. 16, change dormer windows on top story; cost, $6,000; owner, Delaware & Hudson Canal Company, on premises; architect, E. Raht; builders, David Campbell and Cheney & Hewlett.

Fifth Ave., No. 133, new store fronts on Fifth Ave. and on Twentieth St.; cost, $4,000; lessee, Alex J. Roux, 39 West Twelfth St.; architect, E. Raht; builders, Cheney & Hewlett.

East Seventieth St., No. 207, three-st'y brick extension, tin roof; cost, $6,000; owners, Little Sisters of the Poor, S. Blanche de St. Maria, President, 207 East Seventieth St.; architect, John McIntyre; builder, Terence Kiernan.

Philadelphia.

Building Permits. — *Germantown Ave.*, opposite Rex Ave., two-st'y dwell., 28' x 40'; Geo. S. Roth, contractor.

Little Medina St., No. 726, two-st'y dwell., 14' x 28'; W. K. Hallowell, Jr.

Tacony Road, s Fraley St., three-st'y dwell., 17' x 46'; Chas. Bosser, contractor.

Twenty-first St., n e cor. Johnson St., three-st'y dwell., 17' x 47'; S. P. Johnson, contractor.

Nineteenth St., n Willow St., three-st'y foundry, 20' x 74'; W. C. McPherson, contractor.

Christian St., Nos. 2629 *and* 2631, 3 two-st'y dwells., 16' x 43'; Pat. Riley, owner.

Thirteenth St., cor. Lombard St., four-st'y brick building, 18' x 27'; W. P. Fogg, contractor.

North Front St., No. 9, storehouse, 16' x 30'; and on *Venango St.*, e Third St., freezing and press house, 17' x 61'; Quaker City Oil Co., Limited.

Fifteenth St., cor. Cathedral Ave., 2 two-st'y dwells., 16' x 45'; Geo. Matlack, contractor.

Germantown Ave., w Southampton Ave., two-st'y dwell., 20' x 44'; and on *Orthodox St.*, w Mulberry St., three-st'y dwell., 18' x 32'; Poucher & Shoch, contractors.

L St., n w cor. Venango St., two-st'y store and dwell., 20' x 33'; Daniel Regester.

Lattimer St., No. 1527, two-st'y coach-house, 30' x 32'; Jas. Howard & Co., contractors.

Moyamensing Ave., n e cor. Moore St., three-st'y dwell., 18' x 58'; O. H. Hoffman, owner.

Rear of Bowman St., w Queen St., 4 two-st'y dwells., 16' x 16'; Alfred Taylor, contractor.

Drinker's Alley, e Second St., addition to foundry, 44' x 47'; Keister & Orem, contractors.

Germantown Ave., cor. Montgomery Ave., three-st'y hotel, 25' x 85'; E. Schmidt, contractor.

Parker's Ave., e Ridge Ave., three-st'y dwell., 14' x 28'; E. C. Parker, owner.

Forty-eighth St., cor. Chester Ave., three-st'y dwell., 27' x 49'; Jas. D. Arthur, contractor.

Spruce St., No. 1823, four-st'y brick building, 14' x 56'; Geo. McNichol, contractor.

Westwood St., bet. Thirty-second and Keifer Sts., 2 three-st'y dwells., 15' x 44'; Wendell Smith.

Amber St., cor. Somerset St., three-st'y dwell., 18' x 56'; Jas. McCartney, contractor.

Hancock St., Nos. 5051 *and* 5053, 2 three-st'y dwells., 18' x 42'; T. W. Wright & Son.

South Fifteenth St., No. 1211, three-st'y dwell., 17' x 56'; Jno. O'Donnell, contractor.

Midvale Ave., bet. Reading Railroad and Hunting Park Ave., Nicetown, 16 two-st'y dwells., 14' x 30'; G. W. Blabon, owner.

Mount Pleasant St., w Germantown Ave., two-st'y dwell., 16' x 32'; Octavia Gavett, owner.

Charlotta St., No. 829, three-st'y dwell., 16' x 24'; L. Schwab, contractor.

Sixteenth St., s w cor. Market St., two-st'y dwell., 30' x 40'; Harry Pettit, contractor.

Alder St., n Norris St., three-st'y foundry, 50' x 75'; Michael Smith, contractor.

Queen St., e Thirty-sixth St. (Falls Schuylkill), 9 three-st'y dwells., 14' x 42'; Keeley & Brownback, owners.

Seventh St., n e cor. Callowhill St., two-st'y chemical building, 80' x 81'; R. C. Ballenger, contractor.

Twenty-eighth St., cor. Ingram St., 2 two-st'y dwells., 17' x 30'; John Gregan, owner.

Mount Pleasant Ave., bet. Gresham St. and Germantown Ave., three-st'y dwell., 18' x 42'; Martin Hetzel, contractor.

Washington Ave., above Eleventh St., two-st'y addition to factory, 41' x 54'; Hall & Garrison, owners.

Richmond St., No. 1932, three-st'y store and dwell., 17' x 52'; A. McClay, contractor.

Tioga St., e Richmond St., two-st'y factory, 40' x 100'; F. W. Stapler, President.

Spruce St., No. 2411, three-st'y dwell., 17' x 40'; Townsend Yearsley, owner.

Church St., w Webster St., two-st'y dwell., 16' x 32'; Henry Rowley, owner.

Fifth St., s Somerset St., 3 two-st'y dwells., 16' x 44'; H. Brocklehurst.

Pharo St., No. 759, two-st'y dwell., 16' x 28'; Elenor McCauley, owner.

Madison St., s s, bet. the state road and Wissanoming St., 2 three-st'y dwells., 16' x 42'; Frank Miller, contractor.

South Seventh St., Nos. 520, 522 *and* 524, 2 three-st'y stores and dwells., and two-st'y shop, 16' x 32'; F. J. Ward, contractor.

Turner St., n s, and w s of Twenty-fifth St., 12 three-st'y dwells., 14' x 44'; J. L. Carre, owner.

Garnet St., e s, s Somerset St., 3 two-st'y dwells., 12' x 44'; J. Cairns, contractor.

Emerald St., cor. Willard St., 10 two-st'y dwells., 16' x 43' and 14' x 41'; J. R. Pyle, owner.

Butler St., s s, bet. Fifth and Sixth Sts., 10 two-st'y dwells., 16' x 38'; Thos. F. Middleton.

Mervine St., e s, n Oxford St., two-st'y brewery building; Chas. Wolters.

St. Louis.

Building Permits. — Sixty-eight permits have been issued since our last report, twenty-two of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

A. M. McChesney, two-st'y brick dwell.; cost, $5,000; T. Renick, architect; Chas. Gerhardt, contractor.

Klausman Brewery Co., three-st'y brick malt-house; cost, $20,000; E. Janssen, architect; contract sub-let.

W. N. Graves, two-st'y brick dwell.; cost, $7,000; E. Mortimer, architect; Chas. Wehking, contractor.

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CONTENTS.

THE Seventeenth Annual Convention of the American Institute of Architects was a very harmonious and successful one. The amount of business transacted was not large, but the measures adopted were of considerable importance to the future of the Institute. About forty members were in attendance, including several from Ohio, one from Chicago, one from Indiana and one from Georgia, besides many from New York and Boston. The morning session of the first day, after the delivery of the President's Annual Address, was devoted to hearing the reports of the officers of the Institute and the Secretaries of the various Chapters, all of which indicated quiet prosperity. The membership of the Institute was shown to have increased considerably during the year, many accessions being reported from the Chapters, in addition to the reinstatement of one or two former members whose connection with the Institute had been allowed to lapse. The number of Fellows was reported as sixty-nine, leaving, under the rule adopted two years ago, but one vacancy. It was obvious to every one that this rule had set the limit far too low, and the report of the Committee appointed at Cincinnati last year to consider the question of an increase in the number of Fellows was peculiarly timely. This report had been printed, for the use of members, and after a good deal of discussion, the amendments to the by-laws which it proposed to make were substantially adopted.

THE first of these amendments abolished altogether the limitation of the number of Fellows of the Institute, and struck out also the clause requiring that candidates for that grade must submit specifications and drawings or photographs of some building; instead of this, putting upon the Chapters the responsibility of supporting the petition of candidates known to them, by requiring from them a true and faithful opinion as to their qualifications. The other important amendment proposed was one relating to the constitution of Chapters, by which any association of architects containing one resident Fellow of the Institute may be recognized as a Chapter, upon the approval of its rules and regulations by the Board of Trustees. As our readers will remember, the old rule in such matters was that five resident Fellows should be necessary to form the nucleus of a Chapter. This was recently modified, so as to allow a Chapter to be formed with two Fellows, but the Committee, believing that even this regulation served to hinder the formation of Chapters in places where such associations would be very useful to the profession, decided to recommend the reduction of this restriction to the lowest point, and the Convention unanimously approved of its action. There can be no doubt that the result of this determination will soon be seen in a considerable increase in the number of Chapters, much to the advantage of all the parties concerned.

THE afternoon of Wednesday was devoted to driving about the city of Providence, with visits to several public and private buildings, and in the evening the Convention reassembled to listen to Professor Lanza's lecture upon the Strength of Materials, which was received with all the interest due to the great importance of the subject. The second paper was by Mr. Fox, of Boston, on Competitions, and presented one side of that difficult subject most effectively. The third paper, by Mr. William A. Potter, of New York, on the Conduct of the Supervising Architect's Office, which had excited much curiosity, was omitted, Mr. Potter's engagements obliging him, at the last moment, to give up his visit to Providence. The remainder of the evening was, therefore, spent in examining the drawings contributed for exhibition by members of the Institute, among which Mr. Richardson's magnificent sketches for the Albany cathedral, and Mr. Eppinghausen's drawings for the Indiana State Capitol, were most conspicuous, although there were many others of much interest. The place of honor in the room was given to the only design made in accordance with the resolution of last year providing for a friendly competition among the members of the Institute. This was contributed by Mr. Moser, of Georgia, and showed an immense amount of thought and invention. The Convention listened with much interest to Mr. Moser's informal explanation of his work, and voted unanimously that the thanks of the Institute should be offered him, and that the design, with a key which Mr. Moser had prepared, should be reproduced and printed for the members.

THE morning session of the second day was brief, time only being allowed for the election of officers and a few matters of minor importance. The ticket presented by the nominating committee was chosen without a dissenting voice, Dr. Walter being re-elected President, Mr. Hatfield Treasurer, and the other officers generally being continued for the next year. Mr. George C. Mason, Jr., of Newport, R. I., who, since the declination of Professor Ware, has been Acting Secretary of the Institute, was chosen as Secretary. Just before the meeting was called to order, the members of the Convention assembled upon the steps of an ancient church near by, where they were photographed, with President Walter in the midst. Two negatives were taken, and if the proofs should be moderately successful the interest of the result should be sufficient to ensure the repetition of the same operation at succeeding Conventions. At twelve o'clock the members took the boat to Newport, touching at Rocky Point for lunch, and reassembled in a private parlor of the Ocean House at eight o'clock in the evening, after strolling for a few hours in small parties about the town. The evening began with the reading of a paper by Mr. Clark, of Boston, on The Architect as a Sanitarian, which was followed by an interesting discussion upon the disposal of house sewage by subsoil irrigation. Mr. Rotch's paper was not ready in time for the meeting, and unfinished business was therefore next taken up. Several members having expressed the opinion that new Chapters of the Institute could, by a little effort, be formed in various places which now have no professional association, or if any, one without connection with the Institute, it was considered to be fitting that the Convention should undertake to make some advances, and a resolution was unanimously passed to the effect that Messrs. Keller and Briggs, of Connecticut, and Earle, of Worcester, should be invited to make such efforts as they could toward the formation of Chapters of the Institute in those places, and that the Secretary of the Institute should be requested to communicate with prominent architects in Albany, St. Louis, Milwaukee, St. Paul, and Minneapolis, with regard to the possibility of reviving former Chapters, or constituting new ones. The change in the by-laws of the Institute, under which one Fellow only is needed as the nucleus of a new Chapter, gives sufficient reason for this action of the Convention, and as there is no difficulty, now that the restriction upon the number of Fellows is removed, in obtaining the election of any architect of high professional character to that grade, it seems probable that the invitation will meet with speedy response, not only from the architects of the places named, but from those of other cities and states, which would have been included in the resolution if any one had thought to mention them. This was the last business of the

session, and after a vote sincerely thanking the members of the Rhode Island Chapter for their unwearied kindness, the Convention adjourned. The question of the next meeting of the Convention was discussed, and several suggestions were made, some members favoring Albany, on account of the interest of its new buildings, while some, for the same reason, proposed Hartford, and others Chicago. The whole matter was finally referred to the Board of Trustees, who will probably make an early announcement of their choice. The last day of the Convention was spent in pleasure, the members, after an inspection of the mysterious "Stone Mill," dining together at the Casino, and afterwards visiting, by special invitation, some of the more amous cottages.

A NEW and useful method of ascertaining whether the water of a well is affected by a cesspool in what appears to be hazardous proximity is described in the *Scientific American*. As every one knows, the common test is to throw salt into the suspected cesspool or vault, testing the well-water beforehand, and again later, after the salt has had time to dissolve and find its way through the ground, by means of nitrate of silver, which produces a white cloud in water containing chlorides, and can be made to show the exact proportion of salt contained in the well-water. The quantitative examination of the water, however, is a matter for a skilful chemist, and as nearly all natural waters contain a little salt, the test is an uncertain one without such accurate measurement. For ordinary observers it is desirable to use for placing in the cesspool some substance which is never found in ordinary water, and whose presence, if introduced from outside, can be readily determined, and in a recent legal case, where it was important to determine whether the well of a certain brewery was polluted by infiltration from a foul neighboring well, the ingenious counsel for one party, or, more probably, some expert adviser, suggested that chloride of lithium should be thrown into the foul well, and afterwards looked for in the other. All the soluble salts of lithium have the property of giving a brilliant red color to a flame, and on evaporating some of the water from the brewery well, after the treatment of the other with lithium, the concentrated residuum, introduced on a thread into a flame, showed unmistakably the lithium coloration. In ordinary experiments, the red of the lithium flame, unless the salt were present in large proportion, would generally be obscured by the more powerful yellow derived from sodium, which is present in nearly all flames, but it is possible for the amateur experimenter to neutralize the effect of the yellow rays by holding a piece of blue glass between his eye and the flame, and the red color, if present, will then appear, or the flame may be examined with the spectroscope, which will show all the rays separately with perfect distinctness.

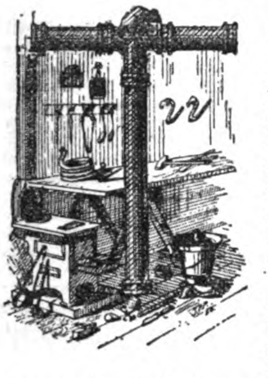
AN illustration of the idea which people of a certain class have of sanitary operations is to be found in an occurrence which took place in New York a short time ago. According to the *Sanitary Engineer*, a respectable colored woman applied to the judge of one of the courts for protection from "two devils" who had bewitched her. She described the devils as appearing like white men, one of them carrying a yellow valise, and the other a red one. They cast their eyes upon her in a sinister manner, so that she was alarmed, and went after a charm to avert the evil influence. She touched them with the charm as an exorcism, but they only laughed, and opening the valises took out a powder which they sprinkled about the door. Some of the powder fell upon her, and she had a return of the horrible pains which the incantations of colored people had brought upon her on another occasion. The judge, on inquiring further into this extraordinary story, ascertained that the "devils" were agents of the Board of Health, engaged in disinfecting the premises, but the prospect of being able to make the victim of their enchantments comprehend their mission seemed rather remote, and he contented himself with advising her to remove her family to another tenement, and to call on him again if the witches still troubled her.

THE *Sanitary Engineer* makes what seems to us a very just complaint in regard to the mode in which bids are usually invited and contracts awarded for steam-heating in buildings. Here and there is found an architect who has taken pains to inform himself upon the principles of the science of steam-heating, and knows enough about the different qualities of valves and fittings, and about the materials and methods of construction of boilers, to be able to specify what he wants, and to be sure that he gets it, but it is still very common, even with architects who possess a very considerable knowledge of steam-heating work, to invite a few well-known engineers to write their own specifications, and submit estimates in accordance with them. This practice has some excuse in the fact that many of the best heating engineers use boilers or radiators of a kind peculiar to themselves, and as it would hardly be prudent to require all the bidders on a job to estimate for putting in a boiler of a pattern controlled by only one of them, architects are compelled, if they would escape loud accusations of favoritism, to give a very large latitude on this point. With regard to steam-pipes and returns, however, and amount of radiating surface, there is no such difficulty. The rules for calculating the number of square feet of radiating surface, and the size and arrangement of pipes, are, or should be, as familiar to the architect as to the heating engineer, and the former, by a little attention to them, can readily draw his specifications so that his intentions as to every important part of the job shall be unmistakable, and he will be rewarded by being preserved from the annoyance and loss of reputation which cheap and irresponsible contractors, working under loosely or ignorantly drawn specifications, are certain to cause him.

THE latest news from the Keely Motor is of a somewhat contradictory character. A few days ago it was announced that the "big engine" was finished, and would be ready for operation about the first week in September, and a final inspection by the trustees was appointed for August 29, at which all stockholders were invited to be present. On the appointed day a considerable number of persons visited the workshop and were unpleasantly surprised to learn that the machine would not be ready for experiments for six weeks. According to the report of a newspaper correspondent, one of the stockholders, who had invited some friends to ride in a train drawn by the mysterious motor on the first of September, appeared to be annoyed at this intelligence, but was comforted by some remarks of the great inventor about a "thirty-pound vacuum," and other obscure topics. The outside world must think that the Keely stockholders are easily comforted, but he probably understands his own constituency, for after the soothing reference to the vacuum, the foreman of the shops informed the company that the price of motor stock would begin to rise within a week. He declined to mention the grounds of his expectation, but kindly proceeded to distribute among the visitors the cards of a Wall-Street broker, who would sell stock to any one desirous of profiting by the expected advance.

IT is gratifying to notice that the subject of improving the dwellings of the poor is steadily growing in importance in all parts of the civilized world. The French Government, among its other innovations, is seriously considering the question of building decent and comfortable abodes for the poorest of the population, while in England and America the subject has been, with great advantage, taken up by private individuals, who have done much themselves, and have led the way for others, to ameliorate the condition of the most helpless and dependent of their fellow-citizens. In one respect the work which has been done in this direction has led to disappointment. Houses have been built upon most excellent plans, full of light, air and sunshine, and offered at rents lower than those asked for the vilest dens in the neighborhood, only to be taken up by persons quite able to pay a higher rent, who crowded into them to the exclusion of those for whom they were intended; worse than this, if the better class of tenants are refused admission, it is often found that the houses remain empty, the most squalid and miserable of mankind apparently preferring to live like pigs in a sty, at a high price, rather than suffer the embarrassment of being lodged in a decent habitation. This perverted taste will probably disappear as the general habits of living of working people improve, so that it is not worth while to lament long over it, and there is no fear that benevolence will not for many years find ample occupation in modifying and improving the dwellings of those who are quite capable of appreciating, and being grateful for, the favors shown them.

SANITARY PLUMBING.



To execute the plumbing of a modern building after the methods now employed, in such a manner as to obtain *perfect* security and convenience, involves so great an expense as to be beyond the means of the ordinary house-owner, and a very general impression prevails that it is impossible without incurring the inconvenience of banishing all the plumbing to some detached building having direct communication with the open air, and otherwise thoroughly ventilated.

This is, however, a popular fallacy. Plumbing fixtures may be safely placed wherever convenience or economy in the arrangement dictates, and to present the grounds for this assertion, and show the manner in which the work may be done, at a reasonable expense, are the objects of this paper.

In many important particulars of plumbing sanitary authorities differ in opinion, and this difference increases the feeling of insecurity on the part of the public. Many sanitarians advocate, for instance, the ventilation of all traps by special stacks of pipes independent of the soil-pipe ventilator; and already this has become a law in many cities. Others claim that such ventilation is positively injurious, as greatly increasing the danger of loss of seal through evaporation, besides complicating the plumbing. Another source of disagreement is in the material and proper jointing of soil and drain pipes. One advocates heavy cast-iron with a joint lead-caulked by hand. Another recommends a lighter pipe and caulked by hydraulic or other mechanical pressure. A third prefers the rust-joint. Still another uses wrought-iron piping with screw joints; and others, finally, would return to the old lead pipe which until recently was used almost exclusively in this country. Lead was abandoned in favor of cast-iron largely on account of the greater resistance of the latter to the corrosive action of sewer-gas. Of late, however, the general custom of ventilating our sewers, soil and drain pipes has removed this objection, and the difficulties of properly jointing iron have caused many to favor a return to lead. The authorities again are divided in their opinions as to the best form of trap, water-closet, cistern-valve, and indeed as to almost every important fixture used in plumbing, and they are always at war on the subject of the proper disposal of kitchen grease.

In view of this unsettled condition on the part of the most eminent authorities, to propose to find and describe in detail a system of plumbing which shall not be open to the objections urged by either party, and to propose to substantiate the position by actual demonstration, might seem to savor somewhat of presumption. Nevertheless, a careful and persistent study of the subject made in an impartial spirit and under circumstances unusually favorable for carrying on experimental research, have led the writer to results of so positive and unexpected a nature in the direction of the disputed points, as to encourage him to make the attempt.

The most intelligent portion of the public, particularly in the Eastern and Middle States, have as yet only begun seriously to turn their attention to sanitary plumbing; and though the demand for literature on the subject is greatly in excess of the supply, the production of improved sanitary appliances is in advance of the demand. This is most strikingly shown by the persistency with which the public adhere to the use of that most abominable of all plumbing contrivances, that antiquated and decayed relic of barbarism — the common pan water-closet, the extent of the use of which may be taken as the index of the popular ignorance in sanitary matters. For within the compass of its fertile container, swarm, as it were, in a hideous mass, illustrations of outrages on every vital principle of sanitary plumbing; indeed, so evident are its defects and so universally has it been decried by all intelligent practitioners and writers, that a plumber who recommends it as a decent fixture to place in a house and displays it in his window as an advertisement of his calling may at once be classed as either ignorant or depraved or both, and unfit to be entrusted with the charge of plumbing work. It should, however, in justice to the proverbially wicked plumber, be said here, that many sell this closet only because they are *obliged to.* The conscientious plumber of to-day deserves a much better reputation than public opinion has given him. There are plenty of unscrupulous ones in the business still. These we should study hard to avoid, but the leading ones are intelligent and enterprising men, eager to keep themselves informed as to the improved methods and appliances which the last few years have developed, to grapple with the knotty problems of sanitary plumbing and to raise their calling to the dignity of a scientific profession; and these men the public are learning to appreciate. Every plumber is obliged to keep in stock and at times set unsanitary fixtures and cheap materials, because a short-sighted public insists upon having them. They cannot *afford* to refuse, but they sell under protest.

In spite of all that has been said and written as to the danger of breathing sewer-gas in confined places, and of the universal testimony of all who have any knowledge of the subject as to the reality of the danger, we occasionally meet a disbeliever; — perhaps one of those eccentric and perverse natures which rejects everything others accept; who calls a wholesome fear of sewer-gas "groundless panic," and the records of the great epidemics, "mere sensational stories." "The plumber," he says, "is a sufficient refutation of these notions, for he works at the very jaws of the sewers and flourishes on their breath."

Now this is a very careless and mischievous assertion; for plumbers do suffer from sewer-gas poisoning like other people, and the most prudent of them take every precaution to keep the "jaws of the sewers" well gagged while they are at work upon them.

It happens that a young plumber now at work in the office of the writer has but just resumed work after a severe attack of typhoid fever which he believes he acquired from exposure to sewer-gas, and the reasons he gives for this belief appear to be convincing.

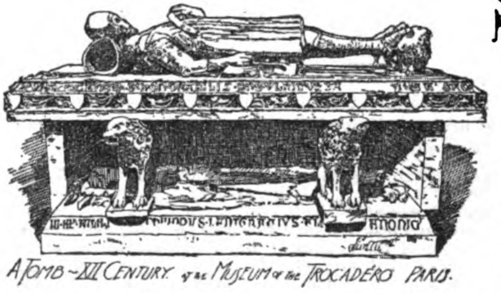
Plumbers lead an out-of-door life and must be in the full vigor of youth to carry on properly their somewhat arduous calling. This undoubtedly enables them to withstand the enervating effects of an occasional exposure to sewer-gas better than others. The disease germs are not friendly to the toughened system nourished by plenty of oxygen. It is in the feeble body, debilitated by confinement and impure air that they find their "happy hunting grounds." In piping a house for plumbing, the work is completed before the sewer connection is made, and the sewer-gas is not allowed to play about the building with such unrestrained liberty as many seem to imagine. It is now supposed that a single germ of disease entering a system prepared for its propagation is as potent to produce death as a thousand, for a single microscopic germ the ten-thousandth part of an inch in length is capable, under conditions suitable for its cultivation, of producing in five days enough of its kind to fill the entire Atlantic Ocean.[1] The breathing of sewer-gas seems to have the property of preparing the system for the propagation of these wonderful and terrible organisms. Whereas on the contrary a copious supply of fresh air and oxygen destroys them. It is possible that fresh air taken in large quantities into the lungs before exposure to sewer-gas, fortifies them for a time against the danger from disease germs, and this may act to a certain extent in favor of the plumber. However this may be, it is certain that no medical fact rests on better evidence than that gases arising from decomposing sewage are one of the most fruitful sources of disease. In recognition of this fact the exclusion of sewer-gas has, within the last two or three years, in our large cities been made the subject of careful legislation. Such laws are greatly needed. Mr. Bayles in his excellent work on "*House Drainage and Water Service*" written in 1878, says: "As the plumbing work of our houses is commonly done, it would be better for most of us if we had to bring our water in buckets from a public hydrant and carry our waste to the culvert at the nearest street corner."

Classification of Subject.

The first division of our subject will include the consideration of:

1. The efficiency of the water-seal.
2. The water-closet, and its flushing and sealing arrangements, including the supply-cistern and valve, supply-pipe, trap and waste-pipe.
3. The wash-basin and its appurtenances, including the supply-pipe, faucet, waste-pipe, trap and overflow-pipe.
4. Traps in general.
5. Soil and waste pipes in general.

LECTURES ON ARCHITECTURE.[2] — II.



A TOMB — XII CENTURY of the MUSEUM of the TROCADÉRO PARIS.

SINCE the first and most obvious reason of building is the desire to provide for the shelter and convenience of man in civilized countries, the first principle belonging to architecture grows out of this primary necessity, and has been shown to consist in the fitness or usefulness of the structure. This source of beauty is the same in all those edifices, however they may vary in their style or kind, which are in every essential particular suited to the obvious wants which gave rise to their erection. This has been shown in two of the most dissimilar structures that could possibly be conceived: the Grecian temple and the Gothic cathedral. I have endeavored to explain the circumstances from which these varieties resulted, and to describe those wants and uses

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[1] This statement at first thought seems incredible; but it is easy to follow the steps which lead to such formidable results, for bacteria have been observed to increase by binary fissure, and to double themselves within an hour. The temperature, quantity and quality of nutriment and other conditions necessary for the unlimited development of the bacteria do not exist in nature, and we are fortunately protected from the destructive invasion of these invisible monsters. —See "*The Bacteria,*" by Dr. Antoine Magnin, translated by George M. Sternberg, M. D. Published by Little, Brown & Co., Boston.

[2] Extracts from a lecture by the late Mr. Arthur Gilman, delivered before the Lowell Institute, Boston, in the winter of 1844–45. Continued from page 89, No. 400.

which led to the adoption of such peculiar and distinctive forms. If any of these correspond in their nature with those which impel us at the present day to construct dwelling-houses and churches or other public buildings, it will be proper to adopt the forms in question so far as this parallel is found to extend, but certainly no farther. Thus the claims of any particular style, and the merit of any building in which any one of them is exhibited, may be estimated, in regard to their *first* requisite, by a very simple and intelligible principle.

But there is another point, to which, as yet, I have scarcely alluded, and which seems to have a natural connection with this part of our survey. The *fitness* of architectural works is regulated to some extent by the nature of the material employed. Thus, when we are necessarily restricted to the use of a certain material, it has been observed that both fitness and good taste require a correspondence between the material used and the style adopted for the building. There is something very offensive to propriety in making the materials perform a part which does not belong to their nature; it is a deception upon the eye, which the mind does not readily pardon. Heavy and massive architecture in all ages and countries has been executed only in the most durable and time-defying stone, and a temple or a castle would make but a poor figure if this were not the case. Cottages and small villas, on the other hand, in some of the light and fanciful styles, may with greater propriety be erected in wood, since that material is often in harmony with the leading expression of their form and outlines. "There cannot well be a greater violation of correct taste than to build a castellated Gothic mansion with thin, unsubstantial wooden boards. It is a species of counterfeit coin," observes Mr. Downing, "which will never pass current with cultivated minds." De Tocqueville, in his remarks on the spirit in which the Americans cultivate the art, says: "When I arrived for the first time at New York, by that part of the Atlantic Ocean which is called the Narrows, I was surprised to perceive along the shore, at some distance from the city, a considerable number of palaces of white marble, several of which were built after the models of ancient architecture." His surprise was still greater, however, when he went the next day to inspect the temple that had particularly attracted his attention, to find that its imposing portico was supported by huge, hollow columns of painted wood.

Fitness, then, may be defined as the beauty of utility; but there is a second quality, that of *expression* — the expression of purpose in the structure — which has been called the beauty of propriety. This expression of purpose in architecture is conveyed by those leading features in a building which make up its whole appearance, and which at once suggest the end in view, and set forth the peculiar purpose for which it is intended. A church, properly constructed, for instance, is easily recognized by its spire; a dwelling-house by its chimneys and the arrangement of its domestic offices; or a barn by its plain, large doors, the absence of chimneys, and the obvious omission of ornament. Our reason acknowledges a satisfaction in finding them to be what they appear, or, in other words, with the truthfulness and reality of their expression. Whatever, therefore, tends to heighten expression of purpose, must grow out of some quality which connects itself in the mind with the use for which it is designed, and the most genuine mode of increasing our admiration of any building is to render it strictly expressive of the purpose for which it is erected.

A striking instance of the total violation of this obvious principle was given in the famous folly of Fonthill Abbey, which was designed by the same Wyatt who nearly demolished the whole of Salisbury Cathedral. At Fonthill, which he began for Mr. Beckford in 1795, he committed the blunder of representing an abbey, not as a habitable building combined with a church, but as a house in the shape of a church; the vestibule occupying one whole transept, the offices another, and the nave and choir filled with parlors, dining-rooms and sleeping-apartments — with nothing of reality about it but the kitchen. Every one can readily perceive the absurdity of such a freak, because it was an unusual one; but let us see whether we cannot find, or rather, whether we are not obliged to notice cases, in every way its parallel, in daily occurrence among ourselves.

> "Although," says an excellent author, "at first thought it would appear that persons would be little likely to fall into error in violating the truthfulness of a building, yet examples do not unfrequently occur. Some of our dwelling-houses are so meagre and comfortless in their exteriors that one might be fairly pardoned for supposing them barns, and, on the other hand, we have seen stables so decorated with green shutters and pilasters that they have actually been mistaken for dwelling-houses." "A blind passion for a particular style of building," he continues, "may also serve to destroy expression of purpose, and it would certainly be difficult for a stranger, in some of our towns where the taste for Grecian temples prevails, to distinguish with accuracy between a church, a bank, and a hall of justice."

Not only should the whole structure, then, have a general character denoting the end in view, but every portion of it should be made, as far as possible, to convey the same impression. The various useful features entering into its composition should all be expressive of their end, and should appear to answer their particular purpose. But if all these distinctions are to be overlooked, and all these principles disregarded, and a universal model adopted in which none of them are contained, the scale of its exactitude becomes that of its incongruity, and the deviation from principle is just in proportion to the fidelity of imitation. This, it cannot be denied, is the case with by far the greater proportion of American architecture at the present day.

I will endeavor to furnish some additional proof of this observation: —

> "Many of our contemporaries," says the *Quarterly Review*, "many whose genius no one can respect or prize more highly than we do are desirous of introducing the *pure* Grecian style for the purposes both of ecclesiastical and civil architecture; but even their talents cannot naturalize architecture of ancient Greece in modern England. The Grecian temple will not submit to be transported into our atmosphere. No adaptation can be given which will reconcile it to utility. Plate-glass windows glaring through the intercolumns, chimneys and chimney-pots ranged above the pediment, are just as appropriate as English nouns and verbs would be in a Greek hexameter. When the architect's portfolio is opened, and the drawing is shown, these incongruities escape observation in the neat lines and coloring of a geometrical elevation, which can be made to look just as the artist pleases; but when the scaffold is struck from the real building, standing in the open air, they then strike us most forcibly, and we are compelled to acknowledge that its principles are too stubborn and unmanageable. View the Grecian temple as a dwelling-house, and with relation to its inhabitants, and then every part and portion which contributes to their comfort or convenience is a grievous sin against architectural fitness, for they are rejected by the very essence of the building into which they obtrude themselves. Is it considered with regard to its destination? Is the architect retiring into his study to plan the justice-hall, or the college, or the church? Why, then, every sign which tells the intention of the structure — which connects it with the policy, the learning or the religion of *our* age, becomes a monstrous and perpetual solecism. If such difficulties as these are considered, it will soon be understood how they estrange the architect from the intellectual cultivation of his art, and reduce him to a mere mechanical draughtsman."

Upon the high authority of the *Quarterly Review*, then, it would appear that the votaries of the Grecian orders are no wiser than Mr. Wyatt had shown himself to be at Fonthill Abbey. If there be any difference, indeed, it is certainly in his favor, since the style which he employed there was at least the natural offspring of the country where he undertook to use it, and when applied in a proper manner, produced very striking and satisfactory effects; while, on the other hand, the Grecian style is fitted for no single purpose which our habits and uses require, either in public or private buildings, and can never appear well in New England under any circumstances whatever.

Twenty-two years later, nearly a quarter of a century after the *Quarterly Review* thus eloquently declaimed against such false taste in the art, we find another able journal holding very similar language.

> "We try," says the *Westminster Review*, published in April last [1844], "we try an architecture totally unsuited to our climate, and worse than useless for our purposes. Did the evil consequences of this system stop here, it would not be so serious as it really is; but thus it is that in copying and trying to adapt the classical types, we have learned to be mere copyists (in everything), and when we turn our attention to the Italian or mediæval styles, the false system still clings to us, and correctness of copying is still held the greatest merit of every design."
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> "The same absurd system," continues the *Review*, "poisoned our literature for more than a century and a half, though, fortunately for us, we have seen both the beginning and the end of its influence *there*. Cowper first dared to sing of original thoughts and feelings, and the giant hand of the peasant Burns tore to pieces the flimsy web of conventional criticism in which the corpse of our poetry had been wound. But if any one will take the trouble of reading the *Cato* of Addison, the *Seasons* of Thompson, the *Blenheim* of Phillips, or, indeed, any of the thousand and one poems about Damon and Daphne, or Phillis, or Chloris, or Mars or Cupid, which formed the staple commodity of poets of that age, he will be able to form a tolerably correct idea of the merit or absurdity of the classical productions of our architects — always bearing in mind this distinction: that the one is an innocent trifle, the other a positive and expensive inconvenience. A poet may indulge himself in harmless flirtations with dryads and water-nymphs without hurting any one; but a habitation must be either in reality very unclassical or very uninhabitable in this climate, and the whole race of porticos only serve to encumber our streets and darken our windows."

These forcible observations relate, it is true, to the present state of architecture in England, but among ourselves the case is just the same, or perhaps the truth is, somewhat worse. Architectural taste is there taking a very decided turn toward the true principles; but with us it is painful to notice that the offcast mistakes of the Old World find a ready adoption, and Grecian edifices are still the order of the day. The common consent of cultivated minds has indeed fully established this truth: that the system of the ancient architects does not admit of any wide departure from its fundamental principles, and that if these are contravened, the certain and speedy consequence will be the degradation and debasement of all its real beauties. But we are first to take care that we understand in what that system consisted. I should hail with pleasure even the faint indication of a desire to study the spirit and meaning, instead of reproducing the mere forms and details of the works of antiquity. And so long as this energy, this sensibility of taste is wanting, there remains one, at least, of the highest marks of civilization to which we can have no valid claim. The neglect of any such course of study is undoubtedly the cause of all the bad architecture of the present time.

Mr. Jefferson is said to have remarked, in reference to the style of building which prevailed in his day, that "the genius of architecture seemed to have shed a peculiar malediction over America." But if this were his honest conviction forty years ago, it cannot be said that at the present day there is any reason to reverse the desponding verdict. The architectural faults and follies of his times have indeed passed away, but it must be owned that they have been succeeded by others, of a different and more deplorable kind. An expression of character and appropriateness might have been wanting in the works of the former builders; still it was at least aimed at and attempted. The church was erected in one style, the senate-house in another, and the private mansion in another. The State-House, on Beacon Hill, the work of that period, is still, as a whole, the most rational building in the streets of this city [Boston]. The general idea was excellent, while the faults which appear in the execution were the work of

those who had the control, and are not to be attributed to its late respected architect. "The effect of this building," observes Mr. Cleaveland, in his essay on American Architecture, "is very striking. The dome rises above every object, crowning the city, and seeming to give a unity and decided character to the whole. It may be doubted whether any other plan could have produced so good an effect at a distance, as the dome depends less for the impression it makes, upon the detail of its ornament than any other form of building. The wings of the building (he continues) are so short as to appear mean, and render the whole too small for the dome which surmounts it. The original plan made the wings more extensive, but they were clipped by the Legislature, who could not afford to buy so much architecture."

Whatever may be its defects, there is certainly a character and expression in this edifice, which bespeaks its obvious use; but if its erection had been deferred to the present time, there is no doubt but that we should have had a Grecian temple in its place. No discrimination of character would have been shown; the elevation of the Parthenon would have been made the measure of this, as well as of every other public and private structure, and the same drawing that was this day used for a state-house, would to-morrow be sent in as a design for a Grecian church, and the next day as a classic villa. It matters not with the architect how widely different their character, how exactly opposite their purpose; his blind admiration for the Grecian colonnade seems to obtrude the object of its bigotry into every situation, where its inappropriateness becomes most evident and most ridiculous. Thus, the hexastyle portico of Athens is indeed re-copied in every locality, and with every variety of material that ingenuity can devise; but the fitness of the design to the purpose for which it is intended, or the expression in it of the character of the structure, if recognized at all in theory, is much oftener honored in the breach than the observance, in practice.

When, however, it is impossible to give the temple form to a building, the occupation of such one-idea builders is gone. As a last resource, they build up a dead, flat wall, with mere square holes in it for windows, unornamented and unrelieved, and still set a Doric portico up against it, which causes it to look as if the dead wall had fallen down on the back of a Doric temple, just as the portcullis of the enemy's castle fell upon the Baron Munchausen's horse, and cut it forever in two. As there are two very remarkable instances of this wonderful feat of invention in our own streets — the Tremont House and the new Court-House — I will take the liberty to give a somewhat amusing extract, in reference to the latter building, from the same essay by Mr. Cleaveland to which I have previously referred: —

> "As we have never seen the plan of this building," says he, "it has been an unfailing source of wonder to us, as we have watched its progress. It is now so nearly completed that one can form a pretty good idea of what it is intended to be. For the benefit of those who have not looked upon this astonishing structure, we will attempt a description of it, though with a very faint hope of doing justice to the genius of the designer. Let the reader imagine a building so long, narrow and high, as to resemble a sheet of baker's ginger-bread standing upon the edge, and he will have some notion of the outline. 'I think, gentlemen,' said a western friend of ours, to a building committee who were asking his opinion of an edifice of nearly the same proportions as the new court-house — 'I think, gentlemen, if you please, that if you were to turn your academy over upon the *side*, it would cover a good deal of land.' We doubt if good nature itself could, in conscience, say more than this in praise of the court-house. The sides of this elongated and attenuated pile are pierced by numerous windows of different sizes, some arched and some square. At each extremity is a door, above which towers a dead wall, terminated by a cornice like that of the sides, of the simplest form. From this, the roof slopes back toward the centre. Near the eaves of each end of the building rises a broad, thin chimney of stone, terminating in several small pyramids, the effect of which is very remarkable. Thus far there is nothing in the edifice to complain of, because thus far it makes no pretence to architecture, and had the artist or the civic committee, or whoever was concerned, been content with leaving it in this state, we should have been satisfied with having a cheap structure, whose internal arrangements answered the purpose for which they were designed. But it seems as if, after the building was planned, it was thought necessary to make a little display of taste and classical skill, and accordingly we have Grecian porticos built up against the end walls. When General Jackson and Major Downing were at the village of Downingville, the President made a speech to the people, of which the Major gives a report. 'Here,' says he, 'the General was goin' to stop, but says I in his ear: "You must give 'em a little Latin, Doctor." Here he off hat again: "*E pluribus unum*," says he; "*sine qua non*." "That'll do, General," says I.' Our architect's porticos are about as appropriate to the other parts of the building as the General's Latin to the speech he had been making. In themselves they are extremely beautiful. They are of the Doric order, and consist of four fluted columns, the shafts of which are of a single block, rising above a lofty flight of steps, and surmounted by a pediment of the true Attic proportions. But they do not belong to the building; they would look just as well, and would seem as appropriate if they stood on the opposite side of the street. They add nothing to the beauty of the edifice itself, because it has no beauty to add to, and they certainly do not constitute its beauty, because no one thinks of viewing them as parts of it. We should be in favor, therefore, of having them removed from their unfavorable position at the ends of the court-house, and carefully preserved, till they can be used for some building of Grecian architecture, to which they may seem actually to belong, and we assure the architect that his fame would not be in the least diminished by the abstraction."

It would be natural to suppose that these remarks would receive some little consideration in the community. They do not appear, however, to have had the least effect in any quarter. "Boston may be the Athens of America," observes Mr. Cleaveland, "but certainly, the days of Pericles have not yet come."

In fact, the dissemination of knowledge and the corrections of criticism upon this subject seem hitherto to have done but little good. The favorers of the present wretched system appear to argue for victory, and not for truth, and in most cases

> "E'en though vanquished they will argue still."

Our public and private libraries contain many lucid works upon these subjects, in which, without a single exception, these monstrosities are condemned. But still these gentlemen go on, copying and caricaturing the portico of the Parthenon, and it must be that the more opportunity such a person possesses the less he troubles himself to comprehend. Dr. Southey speaks of an admirable print among George Wither's emblems, having for its motto, "*Cœcus nil luce juvatur;*" that is, a blind person is benefited by *no* light. It represents an owl, standing in broad sunshine, with a pair of spectacles on his beak, a lighted candle on either side of him, and a blazing torch in each claw, and the more light there is, the less is the owl able to see. No happier emblem could be imagined to typify that school of builders who rear such enduring edifices of their powers of observation. Architecture requires for its practice the intensest study, and a knowledge of all its proprieties can never be acquired without a great degree of enthusiastic application. It requires, in fact, more taste to appreciate its beauties, and more study to understand them, than such persons will very often be found to possess.

Thus it is not difficult to understand how the designs of such persons, through a want of appreciation of the real nature and business of architecture, should be at once costly, offensive, and full of unsustained pretension. Both in theory and practice we have been committing a great mistake; and the arguments hitherto in use, both by the advocates and opponents of either of the various styles, have generally been based upon fallacious grounds. They have consisted, for the most part, in mere private views and opinions relative to comparative abstract beauty, in the different styles, and these, as might be expected, have proved most inconclusive. To advocate any kind of architecture merely on the score of its intrinsic beauty, will never bring us any nearer to a true understanding of the question. We must go much deeper than this, we must turn to the principles from which all the styles originated, before we can be intelligent or consistent followers of any of them. The history of architecture is in fact, the history of the world, and as we successively inspect the edifices of antiquity, its nations, its dynasties, its religions and its customs are all brought vividly before us. The belief and manners of all people in those remote ages are embodied in the edifices they raised, and they are transmitted to us in this way quite as clearly as in any other. Each one was the inventor and perfecter of their own peculiar style, and each style was the type of their religion, customs and climate. The beauty of these various styles, when viewed with reference to the purposes for which they were thus raised is very great; indeed it would be impossible, under the same circumstances, that it should be surpassed, since each is equally the perfection of what was intended by its inventors. A follower of Bramah or Isis, a fire-worshipper of Persia, or a devotee of the classical mythology could not well have produced anything different from what they have done, and so completely did these edifices embody the principles and worship of their builders, that the discovery of a certain form of temple or of peculiar architectural arrangements and symbols, is at once admitted as evidence of the existence of a certain people and religion in that place. Nay more, it may be urged in confirmation of this fact, that by architecture and ornament alone, learned men of the present time are enabled to make the most important discoveries, relative to the history of nations whose very existence is anterior by many centuries to the Christian era, and of whom the accounts of chroniclers give only such vague and contradictory ideas as to render it very fortunate that we can thus go to the more authoritative testimony of their monuments and remains.

But will the architecture of our time, it has been asked, or so much of it as is solid enough to last, hand down to posterity any certain clue or guide to the system under which *it* was erected. Is it, like that of former ages, the expression of existing opinions and circumstances, the enthusiastic embodiment of the faith, the feeling and the polity of the nation? Is it not rather something entirely apart from these, is it not a confused jumble of styles and symbols borrowed from all nations and periods? I am much mistaken if the uncompromising advocates of such arbitrary restorations would not be repudiated by the humblest architect of antiquity, if he could again return to earth. The condition of his art would involve anomalies far beyond his power to comprehend.

The leaders of the art in England, those from whom the architecture of that country receives its tone and character, have of late years proceeded on very different principles from those I have now reviewed, and have returned in many instances to correct and consistent taste. The erection of the New Parliament Houses in the national Gothic style, is observed by Mr. Pugin to be the greatest advance that has yet been gained in the right direction. "If the architect's design be carried out, we shall then have (says he) a monument of English art which has not been surpassed, even in antiquity. This building is the morning star of the great revival of national architecture and art; and it is a complete and practical refutation of those persons who venture to assert that pointed architecture is not suitable for public edifices. The plan embodies every possible convenience of access, light and distribution of the various halls and chambers, without the aid of false doors, blank windows, mock pediments, adapted temple fronts, and show domes to make up an elevation."

Not less illustrative of the universal applicability of the pointed style, is the beautiful and highly original design for a small church now erecting in this vicinity, the church of St. Luke now in process of completion in Chelsea, from the designs of the architect of Trinity Church in the city of New York. The whole cost of this singular little structure is estimated at only $2,500, a much smaller sum than must have been expended on several gaudy and meretricious fabrics in its immediate neighborhood. If I do not mistake it is intended to seat about four hundred persons, and it does not present a single inconsistency of conception. When we consider the extremely low cost of this building, and the amount of accommodation which has nevertheless been provided, simply by adherence to the natural and consistent principles which were advanced at the commencement of this lecture, we cannot but acquiesce in the remark that "in matters of ordinary use a man must go out of his way to make a bad thing." This little church is as purely Gothic as the vast and magnificent cathedrals of England, and proves the wonderful versatility of the style which can thus adapt itself to such opposite extremes. Thus the universal cry that the Gothic is so very expensive is shown to be incorrect, and it becomes equally evident that some of its most beautiful effects are produced by natural combinations and construction. The real truth is that even the details of this style, when treated consistently, cost less than the ordinary sort of fittings in use among us, and are, at least, twice as durable.

It is some satisfaction to find a design, like this of the Chelsea church, actually reduced to practice amid the chaotic mass of blunders of which we have to complain. Indeed, the progress which the revival of pointed architecture has made within the last few years is most surprising. Errors and mistakes will no doubt be often committed during the course of such a transition. It is only by slow and painful degrees that we can struggle up to a condition of natural and vigorous design. "The age in which we live," observes Mr. Pugin, "is a most eventful period for art; we are just emerging from a state which may be termed the dark ages of architecture. After a gradual decay the style, for style there was, became so execrably bad that the cup of degradation was filled to the brim, and as taste had fallen to its lowest depth a favorable reaction commenced."

"The breaking up of this state of things," he continues, "naturally produced a complete convulsion in the whole system of the arts, and a Babel of confusion has succeeded to the one bad idea that generally prevailed; private judgment runs riot, and every architect has a theory of his own, a beau-ideal he has himself created, a disguise with which to invest the building he erects; one breathes nothing but the Alhambra, another the Parthenon, a third is full of lotus-cups and pyramids from the banks of the Nile, while another works up Stuart's and Revett's Athens on a *modified* plan, and builds lodges, chapels, reading-rooms and fish-markets, with small Doric work and white-brick facings. Thus styles are now *adopted* instead of *generated*, and ornament and design adapted to instead of originated by the edifices themselves."

If any one will carry back his thoughts to first principles in the art he will perceive that there is no escape from the force of these remarks. And so long as we have no fixed theory in architecture, and deem no other scale of propriety necessary in a building than simply that it is our own good pleasure to build it, we shall always remain exposed to such merited censures. There are styles and modes, however, which are strictly congruous with all our present requirements, and which readily assimilate themselves with all the wants and uses of our own period. There are the Italian—varied as it is by the differences of three successive schools, the Florentine, the Roman and the Venetian—and the Gothic with its four periods, the Norman, the Early English, the Decorated and the Perpendicular styles; to these also, in certain situations, we may add some modifications of the Romanesque, and with all these at his command, with all their picturesque varieties of outline and expression the architect can have no reason to complain that he is restricted to a narrow or monotonous field of selection. If rightly and sensibly applied each will furnish us with buildings of less cost, and ranking much higher as productions of art, while in point of convenience they will certainly be far superior to the anomalous structures which at present we are content to rear.

In designing any public building, therefore, the artist never need be at a loss to find examples by which consistently to regulate the arrangement of his own design. It remains, however, to consider the necessities of domestic buildings, and review those forms and modifications of the art which are found to be most easily suited to its character.

In the first place then it is to be observed that all pure and pleasing domestic architecture in any given style has invariably been a subdued expression or manifestation of that style, adjusted to the humbler requirements of the building and the more quiet purposes of domestic life. The same leading quality of expression characterizes the Gothic cathedral and the Gothic mansion, as you may easily perceive in these two examples: the same ruling principles of construction may be discerned in the temple and the villa, in the Grecian Parthenon, and the Italian Villa Capra, but how changed in their features, and how entirely dissimilar in their modifications. All the modes of building in modern use may be referred to two original forms, of which they are only altered varieties, viz.: to the Grecian or Classical, in which you will recollect that horizontal lines prevail, and the Gothic, in which vertical lines prevail; and though it would be very absurd to copy a cathedral, or reconstruct a temple as a domestic residence intended for our daily and constant accommodation still there have not been wanting artists who have caught something of the spirit and beauty of the original masterpieces of art, and transfused them into the domestic styles which have grown out of these to suit the wants of civilized life. Thus, although the pure germ of the Classical style, which is the temple, not being intended originally for domestic purposes is altogether unsuited to them, yet the Roman and Italian styles, which are modified forms of it, are in truth elegant adaptations of its characteristic forms to this purpose. It is truly astonishing how so simple and obvious a fact should be so continually overlooked; it is an axiom which we should expect every novice to understand. The Italian style in particular, by its arcades and piazzas, its terraces and balconies, its projecting roofs, and the capacity and variety of its form is so suited to every want and purpose in a dwelling-house, of whatever cost or dimensions, that an architect must have been at great pains to avoid seizing upon it as the style of all others exactly suited to his purpose.

But if the elements of the classic styles have not been confined to the temple form, neither have those of the Gothic been confined to the cathedral. In this class of edifices, as exhibiting it in its noblest form, it certainly exists in its highest grandeur and purity; but its beauty and picturesqueness have reappeared without any real diminution in the old English styles of domestic architecture. The most perfect and most fascinating examples are those of the mansions of the time of the Tudors, but still the whole rural architecture of England is imbued with its spirit. The manifestations of it are everywhere visible in quaintly carved gables or verge-boards, in wreathed and clustered chimneys, beautiful windows ornamented with simple tracery, and in numberless other details which are equally expressive and characteristic.

For domestic architecture, then, it will be advisable to employ these natural modifications of the great architectural styles where the beauty grows out of the enrichment of some useful or elegant features of the house, such as the gables, windows or verandas, rather than those where some strongly-marked points, which have but little domestic association, overpower the expression of the rest of the building. The Rural Gothic style and the Rural Italian are certainly much the most beautiful modes that can be chosen from for our country residences. Their forms are convenient, their accessories elegant, and their expression highly indicative of the refined and unostentatious enjoyments of the country.

THE ILLUSTRATIONS.

WATER-TOWER FOR THE HACKENSACK WATER CO., WEEHAWKEN, N. J. MR. FREDERICK C. WITHERS, ARCHITECT, NEW YORK.

THIS water-tower is now being built by Mr. John F. Ward for the Hackensack Water Co., of which Mr. Charles B. Brush is Chief Engineer, and is intended for the supply of Weehawken, Union Hill and West Hoboken. The water is brought from New Millford, N. J., a distance of fourteen miles, in 20-inch pipes to the reservoir adjoining (which has a capacity of 15,000,000 gallons at a level of one hundred and eighty feet above tide-water), from whence it will be pumped into the tank in the tower. In the engine-room, which is above the boilers, will be placed two Worthington engines, each capable of pumping 2,000,000 gallons in twenty-four hours. Over this room there will be an office for the Company 24½ feet square, reached by the spiral staircase situated at the angle, which will be continued up to the parapet of the roof, from whence there will be a fine view of the Hudson River and the surrounding country. In the floors over the office will be two sets of rooms for the employés, each consisting of a living-room, three bedrooms, water-closet, closets, etc., and above all will be the tank, 30 feet in diameter, capable of holding 165,000 gallons at a level of 300 feet above tide-water.

BROWNLEY HALL, WELLESLEY, MASS. ALLEN & KENWAY, ARCHITECTS, BOSTON.

THIS house, finished last fall, is the residence of Mr. J. Wentworth Brown. The lower part of the walls is built of Bragville granite, rock-faced; the upper part is "half-timber" construction, the panels being of cement. On the south side is a carved stone sun-dial, with the legend

I · ONLY · MARK · YE · HOURS · WHEN · SHINES · YE · SUN ·
WITH · RICHEST · BLESSINGS · GOD · MARKS · EVERY · ONE·

IN the hall is a large mullioned window, filled with stained glass by MacDonald. The carving throughout was done by Evans & Toombs. Messrs. Norcross Brothers were the builders. In the rear is a stable for six horses and two cows. The entire cost of house and stable was about $50,000.

COMPETITIVE DESIGN FOR A $3,000-HOUSE SUBMITTED BY "*Oliver Twist.*"

"'*Oliver Twist's*' plan does not differ materially from the preceding one except that a servant's room is provided on the ground floor; this is a costly addition, the cellar and trench wall much exceeding in cost what would be required to slightly raise the main roof enough to finish an attic chamber. Two or three feet taken from the veranda would have completed the vestibule suggested, and insured further comfort in winter. The elevation is picturesque and ingeniously varied by simple devices, and the arrangement of the windows on the stairs is interesting. There is the less need of the servant's room in that there are four chambers on the second floor. A door from large

to small chamber has been wisely provided. This has been very generally omitted in some of the best plans, to their loss. The drawings are presented in a sketchy way which narrowly escapes being careless. We are sorry to see that '*Oliver Twist*' rates his commission at $125. If worth anything, he is entitled to more than that."—*Extract from Jury's Report.*

COMPETITIVE DESIGN FOR THE NEW YORK PRODUCE EXCHANGE BUILDING, NEW YORK, N. Y. MR. R. M. UPJOHN, ARCHITECT, NEW YORK, N. Y.

WATER SUPPLY.[1]

THIS book is intended to contain, within a moderate compass, the information in regard to water-supply, and the properties of different kinds of water, which will be most useful to young and inexperienced engineers, as well as to water-committees, persons in charge of water-works, and others who may, as very many intelligent persons do, take an interest in that important subject. In the present period of sanitary agitation, when the air is filled with contending facts and theories about our material surroundings, it is necessary for a writer desirous of presenting fairly the latest results in such a science to select with caution from the material at hand, so as to avoid both the attitude of incredulity which would reject everything not clearly proved, and the unbalanced enthusiasm which would give undue weight to a novel or picturesque hypothesis, but Professor Nichols manages to steer a middle course with remarkable success, and those who have read his treatise on the "Filtration of Potable Water" will recognize at once the clear and careful statement of facts and theories which places the reader in a position to understand current discussions without engaging his sympathies for either side.

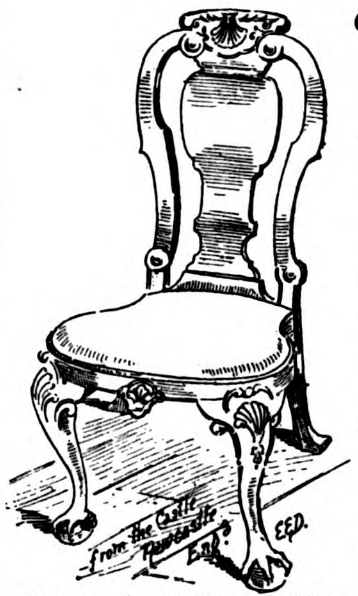
The student, however, who is inclined on other grounds to the adoption of any particular theory in such matters will find, in the mass of general illustration and information which Professor Nichols is able to give, material which he can use to excellent purpose, either for correcting or confirming his opinions. For instance, some of the earliest advocates of sewage disposal by irrigation, instead of discharge into the sea, supported their reasoning by the assertion that the mixture of fresh water containing sewage matters in suspension with the salt water of the sea was attended with a kind of coagulation of the organic impurity, which led to its rapid deposition about the sewer outfall. This observation was ridiculed as a pure delusion by the partisans of the ancient method, but Professor Nichols quotes an account of some experiments made upon the turbid Mississippi water, which, while fresh, requires ten to fourteen days for depositing its suspended clay, but, on the addition of sea-water, clears itself in about as many hours. The same effect is observed in adding salts to liquids containing other finely-divided substances in suspension, and it seems as if the sewage-utilization party may have been right after all.

On the subject of bacterial infection the book gives much information, but without venturing any sweeping opinion. That the development of the anthrax carbuncle is connected in some way with the presence in the system of certain animalcules the author evidently regards as satisfactorily proved, although, singularly enough, he omits all mention of Pasteur in connection with the investigation by which this was established, referring only to some experiments of Koch. The connection of other contagions with similar organisms he speaks of as having been conjectured "with more or less show of reason," and this expression certainly well represents the actual state of knowledge on the subject. Among the various subjects on which valuable and important information is given in the course of the book are some which will particularly interest architects, one of the best discussions of this kind being that on wells. Here, as in all the rest of the book, we find definite statements of fact in place of mere assertion, and these statements of fact are just what the architect wants to enable him to form an opinion of his own. The most important circumstance in regard to any well is, perhaps, the probability of its contamination with sewage. Whether sewage is unwholesome or not is for the moment unimportant; every one will admit that it is desirable to keep it out of drinking water, and there are few architects who have practised in the country who would not be glad to know how to do so with certainty, but the statements hitherto accessible to them in regard to the drainage area of an ordinary well have been generally so conflicting as to be of no use as a guide. Professor Nichols gives what will, therefore, be valuable as a standard of a certain sort, in an account of some experiments made at Berlin on wells sunk in a sandy plain, which showed that in dry weather the influence of the pumping from the well could be traced by the lowering of the level of the ground-water over an area extending nearly half a mile in every direction from it, and even in wet weather the radius of influence was about a thousand feet. Of course, the draught of water from such a distance is very slow, but the fact remains that most wells, after a few months of use, form around themselves a basin of some such extent, down the sides of which the water steadily flows toward them. In regard to driven wells, about the operation of which a good many curious notions are current, we are glad to find here some sensible information. In consequence, probably, of the resistance which a driven well in heavy soil opposes for a time to the action of the pump, it is often supposed that the water in the surrounding earth must be pressed toward the well with a force comparable with that which the operator finds it necessary to apply for extracting it by means of the pump-handle, but it is found, from actual experiment, that the suction of the pump is entirely expended upon obstructions about the point of the pipe, and no more water can be obtained from a given stratum by means of a tube well than any other, while, aside from the cheapness and security from contamination by surface water, of the tube well, it possesses no special advantage, and presents some grave inconveniences.

In regard to the material of service-pipes Professor Nichols gives also some useful information. In his opinion, the use of lead service-pipes for household use, while generally unobjectionable in places furnished with a public supply, should be avoided where the water is drawn from a well, the alternate exposure of the metal to air and water, by the change of level in the contents of the well, often occasioning a very rapid corrosion. As a substitute for lead in such situations block-tin pipe presents the most advantages, being little subject to corrosion, and harmless in most of its combinations, even if chemical action should take place. Next to this, tin-lined pipe, if properly made and put together, is most serviceable. Brass pipes, which might be, but rarely are, used as suction-pipes, are probably acted upon by the water, but it is uncertain whether the corrosion would, with most waters, injure the quality of that which passed through it to an appreciable extent. Galvanized pipe, although cheap, is not durable, the zinc coating being soon corroded so as to expose the iron to rust, while the dissolved and suspended particles of zinc carried away in the water injure its quality, although it is doubtful whether they are absolutely poisonous to those who drink it. Enamelled iron pipes, as found in the market, are quite as durable as the galvanized ones, and impart nothing to the water worse than a slight flavor of coal tar, which comes from some of them while new. In Altona, a suburb of Hamburg, in Germany, wrought-iron pipes coated with magnetic oxide by the Bower-Barff process have recently been put in for service-pipes, and if they prove durable, would seem to be the best yet introduced.

THE $3,000-HOUSE COMPETITION.—XVIII.

DESIGN SUBMITTED BY "*Oliver Twist.*"



CELLAR WALL:—A dry wall, 1′ 6″ thick, and pointed with red mortar above grade. Bottom of "trench" wall to be 4′ below surface of ground.

Frame:—Sills, 6″ x 6″; plate, 4″ x 6″; posts and girts, 4″ x 6″; floor-joists, 2″ x 8″, 16″ on centres; studs, 2″ x 4″, 16″ on centres; rafters, 2″ x 7″, 18″ on centres; trimmers and headers, 4″ x 8″.

Roofing Boards:—The roofing and covering boards of hemlock.

Outside Finish of pine.

Gutter of wood, 4″ x 5″, with 3″ zinc conductors.

Shingles:—Sawed pine, 4″ to weather.

Porch with six posts and seat; rail, 3″ x 4″.

Inside Finish pine, painted. In kitchen, sheathing 3′ high, shellacked.

Under Floors of hemlock.

Upper Floors:—Kitchen and bath-room, hard-pine; elsewhere spruce.

Doors and Windows, factory sizes; machine moulding throughout.

Mantels:—Allow $30 for mantels.

Stairs of ash; one 5″ post, and baluster 1¼″ turned; rail, 3″ x 4″.

Glazing included in carpenter's estimate.

Plumbing to consist of one sink with pump, one bowl, one bath-tub and water-closet.

Painting:—Outside walls to be painted two coats, and in any two colors desired. Roof to be painted with linseed oil and Venetian red. Walls in kitchen to be painted one plain tint.

Hearths and Fireplaces of face brick. Piers, 8″ x 12″; flues of chimney, 8″ x 8″, with 4″ brick around them. Floor of cellar, concrete.

ESTIMATE OF QUANTITIES AND PRICES RULING AT BOSTON, MASS.

CARPENTER-WORK.

8,000 ft. of spruce timber, @ $17 per M	$136.00
4,500 " furring and partition stock, @ $16	72.00
7,500 " hemlock covering-boards, @ $15	112.50
30,000 M. of sawed pine shingles, @ $4	120.00
1,600 ft. of stock for outside finish	7[illegible].00
110 " wooden gutter, 4″ x 5″, @ 12 c.	13.20
Windows complete	160.00
Doors and frames	135.00
Upper floors	125.00
tairs, of ash	115.00

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[1] *Water Supply, considered mainly from a Chemical and Sanitary Standpoint;* by Wm. Ripley Nichols, Professor at the Massachusetts Institute of Technology. New York: John Wiley & Sons, 1883.

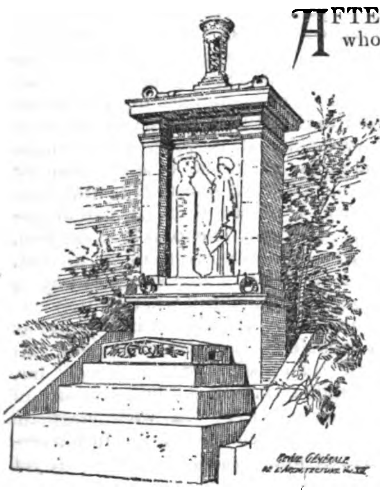
Hardware and nails	$185.00
Work on porch, outside steps, and sundries	80.00
Mantels	30.00
Total	$1,938.70
MASON-WORK.	
20 sq. yds. of excavation, @ $2.50	$50.00
60 perch stone wall, @ $1.75	105.00
6 M. brick, laid, including lime, etc., @ $18	108.00
Two fireplaces and two hearths	60.00
1,250 yds. of plastering, @ 25 c.	312.50
Painting (not including glazing)	200.00
Plumbing	130.00
420 sq. yds. concrete, @ 40 c.	168.00
65 ft. conductors (zinc), @ 15 c.	9.75
Architect's commission	125.00
Total	$1,268.25
Grand total	3,206.95

Chimneys with stone foundations.
Furnace, furnace-pipes and drains not included in this estimate.

SCHEDULE OF DOORS AND WINDOWS.

One door,	3′ 6″ x 6′ 10″	Eight windows,	2′ 6″ x 5′ 6″
Six doors,	2′ 10″ x 6′ 10″	Seven windows,	2′ 6″ x 4′ 10″
Twelve doors,	2′ 8″ x 6′ 8″	Eight windows,	2′ 6″ x 3′ 6″
Ten doors.	2′ 6″ x 6′ 8″	Eight windows,	2′ x 2′ 6″

THE SEWERAGE OF PARIS.[1]— III.



TOMB OF CHERUBINI
CEMETERY PERE-LA-CHAISE PARIS - A. LECLERE ARCHT

AFTER the full discussion of the whole subject, of which the paper of M. Vauthier's, previously printed here, was an important element, the Technical Sanitary Commission of Paris has passed the following resolutions — those requiring the discharge of water-closet matter into the sewers being carried by a vote of twenty-one to six.

Water-Closets.

Article 1. In every house there should be a water-closet for every apartment [suite]. In case of need this may be placed outside the apartment [suite], if on the same floor with it.

Art. 2. Every water-closet shall be supplied from a reservoir, by a supply-pipe, or by other means with a sufficient quantity of water to insure a *minimum* supply of ten litres per person per day.

Art. 3. Each water-closet should be furnished with a water-seal trap below the bowl.

Household Waters and Rain.

Art. 4. The waste-pipes of sinks must be trapped near the upper end.

Art. 5. All leaders should be intercepted so as to prevent direct communication with the sewer.

Art. 6. Every soil-pipe or sink-waste should be carried above the roof to establish active and permanent ventilation.

Art. 7. It is desirable that these soil-pipes carried above the roof, as before said, should be flushed by automatic intermittent flush-tanks, located on the highest story where there are closets.

Art. 8. In order to insure a hermetic and permanent interception between the sewer and the house, the outlet pipes shall be supplied with traps at their lower ends before entering the public sewers.

Art. 9. Waste-pipes shall be tight, of cast-iron or vitrified earthenware, and carried through the house branch[2] to the public sewer.

Vaults.

Art. 10. It is necessary to continue the suppression of the system of fixed vaults. To that end new vaults will not be established, except in cases to be determined by the administration, where the absence of a sewer, the arrangement of the existing sewer, the insufficient supply of water, etc., will not permit the direct discharge either into the existing sewer, or a special sewerage system.

Art. 11. A basin with sloping sides should be sunk at the bottom of the vault, under the man-hole cover, to render the work of emptying easier and more rapid.

Art. 12. In vaults now existing ventilation should be accomplished by inlet-pipes, and by pipes open at their upper ends, and carried above the roof of the house.

Art. 13. It is necessary to insure, with the aid of a sufficient force, a more complete surveillance as to the tightness of vaults, and over the work of emptying them.

Art. 14. The emptying of vaults should not be authorized, except by aid of the most perfect apparatus, especially such as, creating a vacuum in the chambers, have arrangements for the disinfection of the escaping gases.

Movable Tubs.

Art. 15. Movable tubs, of which the overflowing is inevitable, should be suppressed without delay wherever this is possible.

Art. 16. A *temporary* exception may be made in the favor of receptacles supplied with dry and absorbent substances, which are of great service in one-story buildings and for the ground floor, when the renewing of their absorbents is assured by a regular service.

Apparatus for Separation or Dilution.

Art 17. Apparatus for separation or dilution constitutes only an imperfect adjunct of a discharge to the sewer.

Art. 18. Such apparatus should be so arranged as to render overflow into the cellar impossible, and to insure the direct flow of the surplus to the sewer. They are permissible only in houses abundantly supplied with water.

Discharge of Water-Closet Matter into the Sewer.

Art. 20. The total discharge of excremental matters into the sewers may be authorized in the case of sewers having a large and constant flow of water, not subject to an accumulation of sand, and in which matters are carried without halting to the point of discharge in the collecting sewer.

Art. 21. It may be permitted also in sewers less abundantly supplied than the above, but having fall and flow sufficient for the removal of all matters, on the condition that the improvements be carried out which are indicated in Articles 23 and following.

Art. 22. In sewers which do not satisfy the conditions specified in Articles 20 and 21, or in which the back water of the collecting sewers may check the flow, the discharge of excremental matters can be made only in tight pipes placed inside of the large sewers, and carried far enough to reach sewers which do meet the prescribed conditions.

Maintenance and Cleansing of the Sewers.

Art. 23. Flushing wagons carried on rails may be established in 7,600 metres of the old sewers which now receive much sand.

Art. 24. The angles of all inverts should be rounded.

Art. 25. It will be necessary to increase the size, or to reconstruct old sewers to a length of about 10,000 metres. The inclination of their inverts will be increased for about 8,000 metres.

Art. 26. To insure the cleansing of the sewers, independently of the water admitted at the inlets and such as comes from habitations, there will be established a system of flushing by means of reservoirs discharging ten cubic metres of water, placed at the head of each sewer, and at maximum intervals of 250 metres along its course.

These reservoirs will be emptied instantaneously once or twice each twenty-four hours.

Gangs of workmen will follow the movement of the water discharged to cause deposited matters which remain attached to the walls of the sewer to be carried on with the flow.

The length of the sewers in which this mode of cleansing by flush-tanks may be employed is about 424,000 metres.

Art. 27. There will be established in the collecting sewers a certain number of sand-boxes (fifteen at the outside) in such a way that the cleaning boats or wagons may secure the removal of these matters with a delay of not more than twenty-four hours.

Art. 28. Movable catch-basins will be established at the inlets of sewers under paved streets, or others which discharge sand, manure or heavy matters into the sewers. The number of these catch-basins is estimated at two thousand.

Art. 29. The central system of collectors will be so completed as to relieve the collectors of the Coteaux and of Clichy, and to provide a discharging capacity of 400,000 cubic metres per day.

Art. 30. The waters of the lower parts of Grenelle, of Bercy and of the Thirteenth Arrondissement of Paris will be discharged into the collectors.

Art. 31. There will be established at the outlet of the collector at Clichy flood-gates and movable dams to prevent the reflux of the waters of the Seine in time of flood. The flow of the waters of the collector will then be assured by modifying the pumps at Clichy, so that they may raise and throw these waters into the Seine to the amount of 600,000 cubic metres per twenty-four hours.

Purification of Sewage Water.

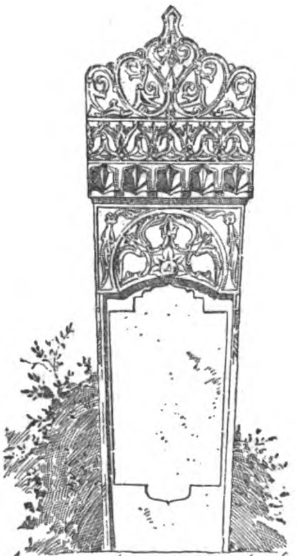
Art. 32. The waters of the sewers of Paris, taken in their present condition, that is to say, containing a large proportion of excremental matters, can be subjected to processes of purification by the soil without danger to the public health.

Art. 33. It is proper to ask the Government to take the measures necessary to interdict the discharge of impure waters into the course of the Seine and of the Marne in their passage through the two departments of the Seine and Seine-et-Oise.

Art. 34. A study will be immediately undertaken as to the purification of the waters of the departmental collectors of the Seine and of the sewers of Paris, which will be connected with them by the irrigation of the plains bordering the river above Paris.

On the 31st of July the Municipal Council of Paris appropriated 50,000 francs for the construction of Waring's system of sewerage in the Rue du Temple, and for the drainage, under his direction, of the public buildings adjoining. This improvement will be completed this season, the work being done by the Drainage Construction Company, of Boston.

THE PROTECTION OF THE MONUMENTS OF CAIRO.



A TOMBSTONE, AT CONSTANTINOPLE

AMONG the minor questions which Lord Dufferin has wisely included in his general revision of Egyptian affairs, the protection of the monuments of Cairo deservedly holds a prominent position. It is known, says a writer in the *Times*, that His Excellency has already suggested to the Khedive's Government a scheme for their better preservation, and that the scheme will probably embrace alike the ancient monuments of the Nile valley and the mediæval architecture of Cairo.

This comprehensive view is clearly the simplest and wisest mode of dealing with the historical and artistic interests of Egypt; but it is the first time that the Arab monuments have been held worthy of a place beside the remains of ancient Egyptian art. The monuments of the Pharaohs and Ptolemies have naturally excited the greater interest, and have been proportionately better cared for. Till late years, however, this care has been altogether inadequate. Tourists have been suffered to chip off

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[1] Continued from page 79, No. 399.

[2] A gallery running from the sewer to the line of property.

pieces of inscriptions and statues, and to blacken the sculptured walls of tombs with their ruthless candles and torches; and even the leading explorers and scholars have joined in the work of spoliation, and thought more of enriching the museums of their own countries than of the lamentable gaps they left in Egypt itself. Even now, though M. Maspéro is as vigilant and single-minded as could be desired, his staff and his powers are not sufficient adequately to control the vandalism of travellers. To lovers of the ancient monuments, therefore, Lord Dufferin's proposal of an archæological police will be very welcome. But to students of Arab art his reforms will seem even more important. The mediæval buildings of Cairo have in recent times suffered infinitely worse treatment than the ancient temples and tombs. They are built, and often very badly built, of perishable materials; some of their finest decoration is in stucco and wood, while that of ancient Egypt is carved in limestone and granite. Thus, with Arab art, the agency of natural decay was added to the neglect and wanton destruction of man. Nothing but constant and skilful repairs could have preserved the monuments of Cairo in their original perfection, though it may be doubted whether any skill could have resisted the action of time upon many of their most beautiful and delicate decorations. The attempt, however, was not made, for the funds with which they were endowed by their pious founders were confiscated early in this century by Mohammed Ali, and since then no one has shown himself inclined to keep up at his own expense monuments which were dedicated to the memory of some one else. It is very probable that the endowments were misappropriated before their confiscation by Mohammed Ali, and it is certain that the present deplorable condition of most of the mosques presupposes centuries of neglect and indifference. The pious zeal or personal vanity which prompted their erection evidently died with their founders, and subsequent generations preferred building new monuments in their own honor to preserving those which were erected in honor of their ancestors. It is the way with all Eastern architectural ambition. Whatever the cause of the present state of the monuments of Cairo, the result is the same. Whatever is to be done now will be done at least a century too late. It is now impossible to restore the mosques and the other exquisite vestiges of the Mameluke era to their pristine beauty, and most of the rich decoration of the interiors is gone forever. They have been allowed to travel too far on the road to destruction. All that can now be done is to preserve them in their present condition as long as possible with the help of every resource of science; to repair such portions as admit of being repaired, while allowing no rash restoration; and to copy, cast, squeeze, photograph, and survey them while they yet stand, and thus preserve their plans and decorations in some form or another before the originals, in the natural course of things, built for a time and not for ever, gradually decay and disappear. If Lord Dufferin can attain this much he will have performed an immense service to art. When it is stated that there are now in Cairo 315 large mosques, 191 chapels, 294 sacred tombs, 200 *sebîls*, or fountains, 35 mosque schools, and 18 hospices, to say nothing of the noble monuments comprised in the extra-mural cemeteries of Kaït Bey and the Kerâfeh (called by Europeans "Tombs of the Khalifs" and "Tombs of the Mamelukes"); that these thousand monuments represent what is vaguely termed Arab art in its purest form, free alike from the excessive elaboration of the Alhambra, and from the grotesque forms and ornamentation of India; that they trace the history of this purest form of Arab art from its early phase (omitting the nondescript mosque of Amr) under Ibn Tulûn in the ninth century of our era, through the characteristic epochs of the Fatimite Khalifs and of Saladin, to the golden age of the Mameluke Sultans and the prince of Cairene builders, Kaït Bey, in the fifteenth century, and then through its gradual decay, under Turkish rule, to the monstrosities of the present century — it will be realized that the preservation of so continuous a series of monuments must be an unspeakable gain to students of art. How beautiful and unique these monuments are those who have visited Cairo repeatedly and for long periods can alone appreciate. There is but one voice among artists and archæologists as to the imperative necessity of preserving them.

It is fair to say that this necessity has of late years been recognized by the Egyptian Government. A commission was appointed at the end of 1881 for the special purpose of protecting these monuments, and it includes the names of such well-known admirers of Arab art as Rogers, Artin, and Franz Beys, and MM. Bourgoing and Baudry, besides the Minister of Vakoufs and other officials. Its work was interrupted after a preliminary meeting, by the late troubles, but it has since resumed its functions with renewed zeal. There appears to be some misconception in England as to the character and work of this "Commission for the Preservation of the Arab Monuments of Cairo." It has been insinuated that the Commission is not only inoperative, but that it is positively in league with the destroyers of monuments. Recent reports from Egypt, however, tend to show that such suspicions are wholly without foundation. The Commission is working hard, and working in a scientific and intelligent manner. It has appointed two sub-committees, one of which is entrusted with the task of drawing up a complete inventory of the Arab monuments (and has already registered between seven and eight hundred of them), while the other is instructed to visit the various mosques, tombs, fountains, etc., which upon information received, appear to be most urgently in need of attention, to report upon their condition and recommend the proper steps to be taken for their preservation. Once a week this sub-committee makes an official tour of inspection, visits a series of monuments, decides whether they are capable of preservation or not, and in the former case reports on the best means of preserving them. If a monument is so wholly ruined that preservation would be both useless and impossible, the Commission removes any fragments of tracery or mosaic, or other objects of interest that may be found among the ruins, to the new Museum of Arab Art, which is being formed in the eastern cloister of the mosque of El-Hâkim, where already a goodly collection of fine specimens of wood-carving, brass and silver-work, mosaics, tiles, enamelled-glass lamps, bronze-plated doors, colored glass and stucco windows, etc., has already been brought together. The recommendations of the sub-committee are not only sent in, but carried into effect; and, with a view to public criticism and surveillance the reports are regularly published by Rogers Bey in the *Moniteur Egyptien*. Every monument which the sub-committee has decided to be worth preserving is forthwith in general committee declared "an historical monument," and from that moment forward no power can touch it, no new road can be opened through it, and no surveyor can dock it to suit the prevailing notion of regulated street frontages. In accordance with the recommendations of the sub-committee, falling walls, arches and towers are propped up with buttresses or beams, ruined gateways are repaired, modern encroachments on monuments are cleared away, and scattered fragments of ruined monuments are taken to the Museum of El-Hâkim. Not only are the known monuments cared for, but others previously unsuspected are discovered in the official tours of inspection. Only last month the sub-committee unearthed the family tomb of the Abbaside Khalifs of Egypt, and every inspection brings to light something novel and interesting to the student of Arab art and the history of mediæval Egypt. Whatever is thus discovered is at once recorded and described in the archives of the Commission; but while every precaution is taken to identify, preserve and record the historical and architectural monuments of Cairo, no attempt is made at restoration. Those who know what restoration means in Cairo will appreciate at its full value this prudent reserve.

Here, then, we see at last the beginning of a proper treatment of the Arab monuments. Thanks chiefly to the energy, learning, and zeal of Rogers Bey, the Commission is working well and on the right lines. Lord Dufferin has here an instrument ready to his hand, and his efforts will doubtless be directed chiefly to strengthening the hands of the Commission. He is well aware that to be effectual the Commission needs to be furnished with additional powers. For example, it can declare a building an historical monument, and thereby protect it from all direct attacks; but its power does not extend to indirect aggression. Many mosques depend for support to some extent upon the surrounding houses, and the demolition of a house over which the Commission has no control may result in the destruction of the mosque. The prime agent in such demolitions is the present code of urban regulations by which the width of streets is fixed at so many metres, while a level frontage is required at the cost of every building that projects too far into the street. Whatever is supposed to interfere with the rapid passage of the two-horse open cabs with which Cairo is now infested must be swept away, according to the present tasteless system. The city is full of evidences of the havoc wrought by this *alignement* regulation, and if it is not immediately checked the injury done to many of the finest monuments will be irreparable. Lord Dufferin's first step should be to limit the power of the Minister of Works in the matter of this *tanzîm*, or street straightening, and to give the Commission power to prevent indirect as well as direct injuries to the monuments. The members of the Commission need no instruction in the importance both of registering and of propping up, and otherwise preserving the Arab monuments; these are their chief aims at present, and they are pursuing them with success; but besides these there are other points to which their attention will probably be directed. One of these is the appointment of a trustworthy body of guardians for the monuments — an archæological police, who, unlike the present *bowwâbs*, should be above the influence of baksheesh at the hands of depredating travellers, and who should receive fixed salaries and charge fixed entrance fees, which should be self-registering. Another important point is proper representation of the monuments by means of surveys, drawings, photographs, casts, etc., while yet such preservation is possible, so that any monument could be accurately reproduced from the data thus recorded. A third point is the organization of the Museum of Arab Art, and the appointment of a competent curator, who should be able to inaugurate a school of Arab design. It must be added, however, that, considering that the museum is quite in its infancy, the Commission has effected a great deal of admirable work in it in an amazingly short time.

One very serious condition remains. The members of the Commission are for the most part busy men, with enough official work to do without their honorary services on the Commission; if the powers and functions of the Commission are increased, it is not easy to see how the members can find time to exercise them. What is wanted is a body of men who can give their undivided attention to the work which has been so ably begun. Of all countries in the world Egypt would appear to be the one in which a Ministry of Fine Arts would be most obvious and appropriate, and there is no reason why the creation of such a department should throw much additional expense on the Treasury. It would only be necessary to make the Director of Archæological Research and head of the Boulak Museum one and the same person with the Minister of Fine Arts,

appoint an under-secretary for Arab art, and establish a competent staff of surveyors, inspectors, and clerks. By levying a fixed entrance fee on all visitors to public monuments, ancient and mediæval, the cost of administration would easily be repaid; real students of Egyptian and Arab art would gladly submit to the imposition of an extra charge, and tourists would be indifferent to a small increase in the national custom of baksheesh. A Ministry of Fine Arts, holding control over all the monuments of Egypt, would meet every requirement, provided the staff were mainly European and properly trained, and there are already enough students of ancient and mediæval Egyptian art to remove all doubt on that score. If such a ministry does not form part of Lord Dufferin's scheme, it may at least be hoped that his scheme will lead up to it in the future. — *The Architect.*

THE DECECO WATER-CLOSET. — A CORRECTION.

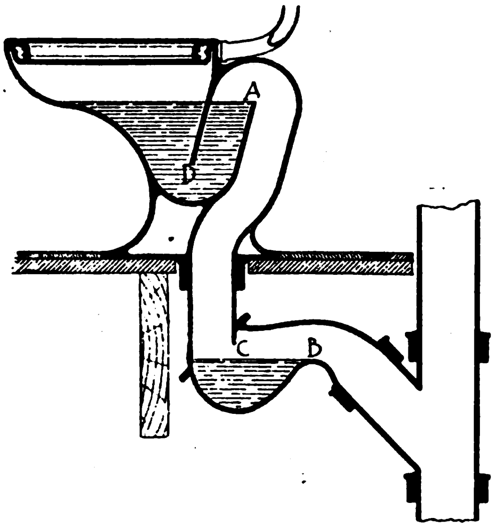
Newport, R. I., August 18, 1883.

To the Editors of the American Architect: —

Sirs,— On page 76 you publish a cut and a description of the "Dececo" closet, which you erroneously call "Waring's Siphon Closet." These are hardly exact.

1. The closet is *not* set over a second trap, which is placed below the floor.
2. There is a "weir" (generally open), but no "lower trap."
3. The comment as to the rising of the water in the bowl would have applied to the earlier form of this closet; it does not apply to the present form. The amount of water required to discharge the bowl is not "excessive." A single gallon is more than enough for this, but more than one gallon should be discharged at each use of any water-closet.
4. The weir below the floor is no more like the "objectionable D-trap" than a cube of chalk is like a cube of cheese. They have similar shapes, but very different functions.
5. The "vent-pipe" *can* be used for the protection of the trap of this closet as well as that of any other.

With these exceptions the description is correct. I enclose an accurate drawing, with a description of the mode of operation, which I beg you to publish.



When water is discharged into the bowl it overflows at A. If the quantity is sufficient it cannot escape at B without rising so high as to close the opening at C. This prevents air from entering the siphon; the air already there is carried out by the current of water, and the bowl is emptied by a rapid siphon action.

As soon as the water in the bowl descends to D air follows it and "breaks" the siphon. Then the contents of the weir-chamber fall below C, and the siphon is again filled with air. The slow stream of the "after-wash" fills the bowl for the next use.

Each discharge of the closet produces a rapid and thoroughly cleansing current through the weir-chamber B C.

Respectfully yours, Geo. E. Waring, Jr.

TRAPPING KITCHEN-SINK WASTES.

Cleveland, O., August 27, 1883.

To the Editors of the American Architect: —

Gentlemen,—I have found several conflicting opinions as to what is the best way to take waste-water from a kitchen-sink. In Chicago it seems to be generally the custom to put simply a running or S trap directly under the sink, continuing the 1½" or 2" pipe to a catch-basin three feet in diameter, built of brick, outside the house, and from that into the main sewer, etc. Here, in Cleveland, one plumber says he always puts in simply a Bower trap directly under the sink; another that he invariably uses an 8" x 12" bottle grease-trap of lead, etc., etc., so that it is plain to see that plumbers, like other "doctors," disagree, and I wish you would be kind enough to decide it for me in the next issue of the *American Architect*, and greatly oblige,

Yours respectfully, Inquirer.

[The question of kitchen-sink traps is a much-vexed one everywhere. We are ourselves still open to conviction, but with a small family, not much addicted to throwing grease and greasy water down the sink, we prefer to use a large ventilated bottle-trap under the sink. The grease seems to remain in this long enough to congeal slightly, forming crusts, which afterwards break up and pass away through the outlet in small lumps. If the drain beyond has a good fall, a great deal of the household grease may thus pass through it without any tendency to clog it up. Such round traps will often run for several years without being clogged with grease, and if they should become stopped, a hot concentrated solution of caustic potash will generally clear them so that they can be used until an opportunity offers for taking out the trap-screw and putting the trap in thorough order. With the S-trap and outside grease-trap, the latter, especially if of brick, gradually collects an immense amount of putrescent grease and sediment, which makes its cleansing a very offensive operation. The Bower trap we should be inclined to use anywhere rather than under a kitchen sink. For such a purpose it combines in some degree the disadvantages of both the others, and has one of its own, that the rubber of the floating ball is injured by the grease. It is only fair to say that the opinion of most sanitary engineers differs from ours in this matter, the rule with them being to employ the S-trap and outside catch-basin, so that we offer our own with some diffidence.—Eds. American Architect.]

NOTES AND CLIPPINGS.

One Cause of Defective Foundations.—Brine Pumping.— The continual pumping of brine, which has now been going on for so many years in the Cheshire (Eng.) salt district, and which in past times has led to such deplorable consequences, has just resulted in another subsidence, not of land, but of water. At Dunkirk, near Norwich, and consequently in the centre of the salt industry, a brook was suddenly observed to be flowing backward, and it soon became evident that its waters and those of an adjoining lake were being swallowed up into some large cavities formed in the rock-salt below. No immediate danger has resulted, but it is feared that the great influx of water will melt the rock-salt, and so lead to serious subsidences in the near future. Many attempts have been made by owners of property in this district to urge upon the Government the advisability of stopping the brine-pumping, which is having such ruinous results, but hitherto without success.— *Exchange.*

Deep-Sea Light-Houses.—A leading English journal endorses a plan recently formed by an English engineer for founding "deep-sea light-houses" as a "hopeful scheme, which, if carried out, will fulfil a want that has long been acknowledged." As explained to the London Society of Engineers this plan proposes the construction of a hollow cylinder of riveted iron-work, two hundred and ninety feet long, to consist of two sections — the upper part to be one hundred and forty feet long, destined to rear its head above the waves and fitted as an ordinary light-house, while the remaining portion of the tube is to be ballasted so as to sink below the water-line, and counteract the force of wind and waves on the exposed part. The whole apparatus is to be anchored in deep water by heavy steel cables. The inventor claims that it would be easy to tow such a structure to the spot selected for it, and then, by admitting water to the lower section, it would assume an upright position and ride the waves like a bottle. The practical use which this is intended to serve is to give notice of approaching storms by means of telegraphic connection with the shore. It is believed to be practical to found a floating telegraph station, say one thousand miles from the coast of England in mid-ocean, from which comings of approaching storms could be given at least twenty-four hours before their arrival.

Utilizing Ashes. — Mr. J. A. Shinn has obtained a patent for the use of ashes in making mortar. It has been found that the fine portion of domestic ashes is capable of being converted, with a small proportion of lime, into a mortar having, when a month old, a tensile strength of from four to five times that of common sand-and-lime mortar, or about 80 pounds per square inch. Sand-mortar a month old has a tensile strength of 20 pounds. Ashes and lime mixed as béton, gives a tensile strength of 140 pounds and a crushing strength of over 1100 pounds per square inch. It will thus be seen that, by utilizing the ashes for mortar, a large part of the expense of removal could be saved, together with the whole cost of procuring sand for that purpose, and, at the same time, a very superior article of mortar be produced. In consequence of the small quantity of lime required (ten per cent.), it would be necessary to mix the mortar by machinery at a mill and deliver it ready for use. This practice prevails to a great extent in European cities on account of the superiority of milled over hand-made mortar. Ash-mortar has the additional advantages of resisting the action of water as soon as it has set (in from two to three days), and also the combined action of fire and water, the quantity of lime being so small and the chemical union with the ash so complete that the application of heat does not produce free oxide of lime, as in the case of sand-mortar, and consequently does not swell when water is applied to the heated mortar. The weight of ash-mortar is about one-half that of sand-mortar when both are dry, and it works soft and smooth. Ash-mortar forms, when set, a silicate of lime and alumina, and hardens uniformly throughout, like cement; while sand-mortar, when set, is but an imperfect carbonate of lime, the sand furnishing the nucleus around which the carbonate forms. Ashes made under steam-boilers, or in other fires where a high degree of heat is maintained, are not suitable for mortar, owing to the chemical change which takes place in the fire, the finest part of such ash, that found behind the bridge-wall of the boiler, being found to be of the same nature as the coarse clinker, having no special affinity for lime, and being only fit for combination with cement or plaster. — *Metal Worker.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

283,755. FIRE-ESCAPE. — George A. Clapp, Quincy, Mass.

283,756. STEAM-GENERATOR. — Wm. Cooper, Chicago, Ill.

283,758. BRICK-MOULD.—Alexander F. Crowe, Emporia, Kan.

283,770. PRESSER-FOOT DOOR-OPENER. — George L. Geiger, Philadelphia, Pa.

283,776. LOCK. — Frank Augustus Guthrie, Gallipolis, Ohio.

283,789. FIRE-PROOF MATERIAL FOR FILLING SAFES, DOORS, ETC. — George Kelly, Chicago, Ill.

283,831. ELEVATOR. — George Burder Thayer, Boston, Mass.

283,833. COMBINED CUTTING-PLIERS AND PUNCH. — John Thomson, Hartford, Conn.

283,844. BIT-STOCK. — Charles H. Amidon, Buffalo, N. Y.

283,892. EAVES-TROUGH HANGER. — Clinton D. Hyre, Lexington, Ill.

283,896. SASH-FASTENER. — Eleazer Kempshall, New Britain, Conn.

283,908. ROOF-SCAFFOLDING. — Aaron R. Manly, San José, Cal.

283,913. SKYLIGHT. — James McIntyre, Boston, Mass.

283,929. MACHINE FOR SAWING STONE. — David Shortsleeve, Rutland, Vt.

283,941. WINDOW-BLIND. — Joseph Williams, San José, Cal.

283,946. SASH-BALANCE. — George Wilt Arnold, Knoxville, Ill.

283,953. HEATING-STOVE. — H. Clay Bascom, Troy, N. Y.

283,961. FIRE-ESCAPE. — Henry E. Braunfeld, Philadelphia, Pa.

283,968. FIRE-ESCAPE. — Henry B. Church, Grand Rapids, Mich.

283,969. FIRE-ESCAPE. — George H. Clowes and Edward L. Frisbie, Jr., Waterbury, Conn.

283,987. SIPHON-FAUCET. — Norton A. Ellis, Boonesborough, Iowa.

283,996. ART OF EXTINGUISHING FIRES. — Charles Lyman Garfield, Albany, N. Y.

284,008. STOP-HINGE. — Theodore M. Hass, New York, N. Y.

284,012. BURGLAR-ALARM. — Frederick D. Hill, New York, N. Y.

284,015. WRENCH. — Isaac Q. Holmes, Clarksville, Ark.

284,016. WATER-CLOSET. — James L. Howard and Charles P. Howard, Hartford, Conn.

284,038. SAWING-MACHINE. — George McCoy, New Dungeness, Wash. Ter.

284,045. JOINT FOR DIVIDERS AND CALIPERS. — Charles Morrill, New York, N. Y.

284,046. FASTENER FOR THE MEETING-RAILS OF SASHES. — Charles Morrill, New York, N. Y.

284,053. COMPOSITION OF MATTER FOR FIRE AND WATER PROOF COVERING FOR ROOFS AND WALLS, ETC. — Robert J. Pattison, New York, N. Y.

284,076. SOCKET-WRENCH. — Albert P. Searles, Mount Kisco, N. Y.

284,082. LIGHTNING-CONDUCTOR. — Henry W. Spang, Reading, Pa.

284,088. FIRE-ESCAPE. — John G. Thomas, Newark, O.

284,106. APPARATUS FOR UTILIZING THE WASTE HEAT OF STOVE-PIPES AND CHIMNEYS. — Hiram M. Wheeler, Smithson, Ind.

284,117. WINDOW-GRATING. — Lewis N. Byar, Pottstown, Pa.

284,140. APPARATUS FOR VENTILATING, HEATING, AND COOLING BUILDINGS. — Thomas McGrory, Philadelphia, Pa.

10,377 (*Reissue*). WATER-CLOSET. — George Milne and William H. Gants, San Francisco, Cal.

SUMMARY OF THE WEEK.

Baltimore.

DWELLINGS. — Thomas Dixon, architect, is preparing plans for Messrs. Wilson & Hunting, Mr. Hubner, Mr. Hanway, and others, for a block of 17 three-st'y houses, each 18′ 9″ x 60′, to be built on an avenue fronting Druid Hill Park, some of which will be of brick and Ohio sandstone finish, and the others of serpentine stone, to cost $3,500 each.

LIBRARIES. — Chas. L. Carson, architect, has prepared plans for 2 one-st'y branch libraries of the Enoch Pratt Free Library, each 40′ x 80′, to be built on the cor. of Calhoun and Hollins and Fremont and Pitcher Sts., respectively. They will be built of brick, with stone and terra-cotta finish, and cost $10,000 each; J. F. Adams, builder.

BUILDING PERMITS. — Since our last report sixteen permits have been granted, the more important of which are the following: —

Buck & Jackson, 12 three-st'y brick buildings, Mosher St., between Carey St. and Carrollton Ave.

E. W. Haveland, 5 three-st'y brick buildings, w s Gilmor St., s of Presstman St.; and 4 two-st'y brick buildings, e s Vincent Alley, in rear of above.

John D. Fries, two-st'y brick building, s e cor. Canton Ave. and Regester St.

Blanch Bros., 5 two-st'y brick buildings, e s Patterson Park Ave., between Monument and McElderry Sts.

Alex. Kratz, two-st'y brick stable, in rear of No. 3 Bond St., e s, between Baltimore and Hampstead Sts.

Boston.

SCHOOL-HOUSE. — The city committee on public buildings has opened proposals for an addition to the primary school-house at Harbor View, South Boston. The bids were: Hamilton & Parks, $12,300; John French, $12,199; Joseph Hammond, $13,880; S. & H. Ames, $13,462; E. A. McKay, $12,659; John Ransom, $11,680; J. B. Wilson, $11,859; McNeil Bros., $12,200. The contract was awarded to John Ransom.

BUILDING PERMITS. — *Wood.* — *Wheatland Ave.*, near Whitford St., Ward 24, for Alonzo C. H. Laws, dwell., 28′ x 30′, two-st'y hip; Alonzo C. H. Laws.

Terrace Ave., near Food St., Ward 1, for Eben Brown, dwell., 26′ x 27′, two-st'y hip.

Albany St., near East Chester Park, Ward 20, for E. A. Remick, coal office, 18′ x 20′, one-st'y pitch.

Mather St., near Dorchester Ave., Ward 24, for N. H. Whittemore, dwell., 9′ 11″ x 23′ 6″, 26′ x 33′, 14′ 5″ x 18′ 6″, two-st'y hip.

Holmes Pl., near Mill St., Ward 24, for Thomas Knapp, dwell., 14′ x 14′, 22′ x 30′, two-st'y pitch; E. H. Hubbard.

Maywood St., near Blue Hill Ave., Ward 21, for Michael Leonard, 2 dwells., 20′ x 38′, three-st'y flat.

Elmo St., near Erie Ave., Ward 24, for David Simonds, 2 dwells., 22′ x 54′, three-st'y pitch.

Church St., near Mt. Vernon St., Ward 25, for Ellen M. Skehan, 2 dwells., 20′ x 30′, two-st'y pitch; Wm. McArthur.

Cambridge St., cor. Brighton St., Ward 4, for H. M. Ayer, store, 20′ x 25′, one-st'y flat; T. C. Woodworth.

Border St., No. 238, Ward 1, for John S. Weeks, storage of iron, 16′ x 18′, one-st'y pitch; Frame & Patten.

Bailey St., near Washington St., Ward 24, for Clark Bros. & Co., 2 dwells., 13′ x 14′, 17′ x 26′ 2″, two-st'y pitch; Alden B. Beal.

Brooklyn.

BUILDING PERMITS. — *Hancock St.*, n s, 270′ w Marcy Ave., three-st'y brownstone front dwells., tin roof; cost, each, $8,000; owner and builder, P. Brady, 885 Pacific St.; architect, M. J. Morrill; mason, not selected.

Richards St., e s, 750′ e Elizabeth St., four-st'y brick storage warehouse, gravel roof; cost, $20,000; owners, Beard & Robinson, Erie Basin; architect and builder, H. Turner; mason, J. C. Heavey.

Third Ave., e s, 75′ 2″ n Thirty-second St., three-st'y brick store and tenement, tin roof; cost, $3,500; owner and builder, Jas. McWalters, 692 Third Ave.; architect, W. H. Wirth.

Central Ave., e s, 55′ n Prospect St., three-st'y frame double tenement, tin roof; cost, $4,300; owner, Jos. Wendel, Central Ave., cor. Prospect St.; architect, G. Hillenbrand; builders, W. Rauth and J. Rueger.

Elm St., No. 61, n w cor. Myrtle Ave., three-st'y frame store and tenement, gravel roof; cost, $5,000; owner, Paul Arndt, 1246 Myrtle Ave.; architect, J. W. Heustis; builders, J. Bayer and P. Scheu.

Atlantic Ave., s s, 166′ e Rockaway Ave., 2 three-st'y frame dwells., gravel roof; cost, each, $1,700; owner, architect and builder, Darius C. Davison, 125 Sumner Ave.

Fifth Ave., s e cor. Eleventh St., four-st'y brick store and tenement, tin roof; cost, $6,000; owner, Ira W. Kimball, Ninth St., cor. Fifth Ave.

Central Ave., n e cor. Magnolia St., three-st'y frame store and tenement, tin roof; cost, $4,395; owner, George Bork, 307 East Ninth St., New York City; architect, F. Holmberg.

Jefferson St., s s, 95′ w Throop Ave., 5 two-st'y brownstone front dwells., tin roofs; cost, each, $4,500; owner and builder, Wm. Reynolds, 686 Madison St.; architect, I. D. Reynolds.

Stuyvesant Ave., n e cor. Van Buren St., three-st'y brick store and tenement, tin roof: cost, $6,500; owner and architect, Wm. Godfrey, 139 Stuyvesant Ave.

Lafayette Ave., n s, 118′ 10″ e Sumner Ave., 3 two-st'y brownstone front dwells., tin roofs; owner, Chas. J. De Bevoise, 104 Debevoise Ave.

Congress St., Nos. 203 *and* 205, n s, 175′ e Clinton St., 3 two-st'y brick dwells., tin roofs; cost, each, $6,300; owner, Wm. Patterson, Congress St.; architect, F. E. Lockwood; builders, T. J. Nash and Morris & Selover.

Chicago.

HOUSES. — Treat & Folz have completed plans for the two-st'y dwell. on Pearson St., in the North Division, for Charles B. Farwell, to cost $90,000.

John M. Van Osdel, architect, has plans ready for three-st'y dwell. in the North Division, on Dearborn Ave., for James M. Adsit, to cost $25,000.

Conrad Seipp will build 3 three-st'y dwells., on Cottage Grove Ave., to cost $15,000; Cudell & Blumenthal are the architects.

Treat & Folz, architects, have plans ready for three-st'y dwell., for Mr. James A. Hunt, to be built on Delaware Place, at a cost of $10,000.

W. W. Boyington, architect, has completed plans for a two-st'y dwell. on South Ashland Ave., for Charles H. Case, to cost $25,000.

J. W. Ackerman is the architect for 2 two-st'y dwells., to be erected on South Park Ave., for H. W. Chase, to cost $12,000.

P. M. Almini will build two-st'y dwell on Michigan Ave., to cost $10,000; S. S. Bemen is the architect.

Blumenthal & Cudell are architects for three-st'y dwell. for Geo. Kleinhaus, on North Wells St., to cost $7,000.

OFFICE-BUILDING. — Wheelock & Clay are architects for the six-st'y office-building, 100′ x 105′, on Pacific Ave., near Van Buren St., for the Open Board of Trade, to cost $130,000.

STORE. — W. C. Grant is building a five-st'y store, Nos. 9 to 13 Adams St., to cost $20,000; Holabird & Roche are the architects.

WAREHOUSE AND FACTORY. — F. Baumann is the architect for the three-st'y warehouse and factory to be built for F. O. Swannell, at a cost of $17,500.

BUILDING PERMITS. — W. A. Hanson, two-st'y and basement dwell., 102 Larrabee St.; cost, $5,000; builder, M. Zebrick.

John Hausberger, three-st'y and basement flats, 3029 South Park Ave.; cost, $5,000; architect, J. Marr; builder, A. Miller.

V. Karnold, two-st'y and basement dwell., 498 West Twentieth St.; cost, $3,600.

L. Kracht, three-st'y flats, 243 Bissill St.; cost, $4,500.

M. Klossen, two-st'y dwell., 31 Tell Court; cost, $4,500; architect, A. F. B.; builder, B. Ebregshauser.

Storey & Clark, three-st'y and basement warehouse, 1349 State St.; cost, $6,000; architect, J. C. Miller; builder, Thos. Wells.

George Wimmer, three-st'y dwell., 139 Lincoln Ave.; cost, $5,000; architect, F. Keltenich; builder, Wm. Hoft.

H. W. Chase, 2 two-st'y and basement dwells., 3222-3224 South Park Ave.; cost, $12,000; architect, J. W. Ackerman; builder, John M. Dunphy.

C. H. Case, two-st'y and basement dwell., 201 Ashland Ave.; cost, $25,000; architect, W. W. Boyington.

P. M. Almini, two-st'y dwell., 1419 Michigan Ave.; cost, $10,000; architect, S. S. Bemen; builder, M. B. Bushnell.

J. C. Scheel, two-st'y dwell., 894 West Adams St.; cost, $5,000; architect, Wm. Strippleman; builder, George Lehrian.

C. B. Wilson, 4 two-st'y dwells., West Congress St.; cost, $8,000; architect, C. B. Wilson; builder, Geo. Lehman.

C. B. Farwell, two-st'y and basement dwell., 95 Pearson St.; cost, $90,000; architects, Treat & Folz.

C. Lehmann, two-st'y and basement dwell., 33 Coventry St.; cost, $3,500.

A. Luetgert, two-st'y factory, 69 and 71 North Ave.; cost, $3,000.

F. O. Swannell, three-st'y and basement warehouse and factory, Division St., cor. Hawthorn St.; cost, $17,500; architect, F. Baumann; builders, Moss & Chambers.

Mrs. J. C. Sternberger, three-st'y and basement store and dwell., 2801 Dashiel St.; cost, $3,000; architect, Wm. Strippleman; builder, J. B. McKay.

T. McNulty, two-st'y and basement dwell., 151 Sedgwick St.; cost, $4,500; architect, John Otto; builder, C. Loring.

C. M. J. Farson, three-st'y and basement store and flats, 3711 Cottage Grove Ave.; cost, $7,500; architect, F. R. Schock.

J. Kennally, three-st'y and basement store and dwell., 149 Milton Ave.; cost, $5,000; architect, John Otto; builder, Fagerlund.

Conrad Seipp, 3 three-st'y and basement dwells., Cottage Grove Ave., cor. Thirtieth St.; cost, $15,000; architects, Cudell & Blumenthal; builder, Henry Appel.

W. H. Lord, two-st'y and basement shop, 73 Hubbard St.; cost, $5,000; architect, Henry Clark; builder, Wm. Zuelsdorff.

James A. Hunt, three-st'y dwell., 21 Delaware Pl.; cost, $10,000; architects, Treat & Folz; builder, Geo. Fries.

J. Kohn, two-st'y dwell., 505 North Paulina St.; cost, $3,500.

Albert Ness, two-st'y and basement dwell., 156 Sedgwick St.; cost, $6,000; architect, John Otto.

James M. Adsit, three-st'y and basement dwell. and barn, 400 Dearborn Ave.; cost, $25,000; architect, John M. Van Osdel.

Dreffein Bros., three-st'y dwell., 237 Rumsey St.; cost, $6,000; architect, H. Kley; builder, Martin Lass.

W. C. Grant, five-st'y store, 9 to 13 Adams St.; cost, $20,000; architects, Holabird & Roche.

F. Salinsky, two-st'y and basement dwell., 737 West Seventeenth St.; cost, $4,500.

Martin Kullas, two-st'y dwell., 716 Holt St.; cost, $4,500.

A. Shutler, two-st'y store and dwell., 336 Twenty-ninth St.; cost, $3,300.

O. E. Wolff, 2 four-st'y and basement store and flats, 857 and 859 Clybourne Ave.; cost, $10,000.

A. McNicholas, two-st'y dwell., 51 Ashley St.; cost, $3,000; architect, J. H. Alexander; builder, D. Hayes.

Open Board of Trade, six-st'y and basement office-building, Pacific Ave.; architects, Wheelock & Clay; builder, Wm. E. Wheeler; cost, $130,000.

C. Schoenhuette, two-st'y dwell., 194 Augusta St.; cost, $3,000.

Geo. Kleinhaus, three-st'y dwell., 485 Wells St.; cost, $7,000; architects, Blumenthal & Cudell; builder, Chas. Thiele.

W. Batcheller, two-st'y livery-stable, 3438 and 3440 Forest Ave.; cost, $9,000; architect, A. D. Hinsdale; builder, J. S. Price.

The Green Estate, 2 two-st'y and basement flats, 450 and 452 Thirty-seventh St.; cost, $12,000.

Cincinnati.

HOUSES. — Geo. W. Rapp, architect, has prepared plans of two-and-a-half-st'y frame dwell. for Albert Schwill, Mt. Tusculum Pl.; cost, $10,000.

Also for a two-and-a-half-st'y frame dwell., for Chas. Wittstein, Kemper Lane, Walnut Hills; cost, $6,298.

Also, altering brick dwell. of Dr. Schneider, s w cor. Ninth and Vine Sts.; cost, $9,500.

BUILDING PERMITS. — F. Hamann, four-st'y brick building, Liberty St., near Main St.; cost, $4,000.

Henry Dietrick, two-and-a-half-st'y brick building, s s Corry St., near Vine St.; cost, $6,500.

Frederick Werner, two-and-a-half-st'y brick building, n s Clark St., between Cutter and Linn Sts.; cost, $4,060.

George Bover, 2 two-st'y brick buildings, s s Moliter St., near Eden St.; cost, $9,000.

Edwin C. Kramer, two-st'y brick building, Moliter St.; cost, $4,500.

Fred. Fricker, two-and-a-half-st'y brick building, s e cor. Eighth St. and Summit Ave.; cost, $6,000.

Benj. A. Hunt, 3 two-st'y brick buildings, s s Chase St., near Langland St.; cost, $9,600.

Repairs for week, $24,537.

New York.

HOUSES. — On the n e cor. of Tenth Ave. and Seventy-third St., four houses, 18' x 55' each, first-st'y brownstone, above Philadelphia brick, are to be built from designs of Messrs. D. & J. Jardine.

A flat, 28' x 72', is to be built on the corner, of same materials, the total cost being about $82,000.

TENEMENT. — For Mr. Jno. B. Haskin, a four-st'y tenement-house, 25' x 65', is to be built on the north side of One Hundred and Twenty-first St., 100' w of Pleasant Ave.

BUILDING PERMITS. — *Boston Ave.*, e s, 300' n Ann St., one-st'y frame ice-house, gravel roof; cost, $3,000; owner, Geo. Keller, West Farms; architect and builder, J. C. Stichler.

Courtlandt Ave., w s, 75' n One Hundred and Forty-ninth St., three-st'y frame tenement, tin roof; cost, $4,500; owner, Franz Wilz, Courtland Ave., between One Hundred and Forty-eighth and One Hundred and Forty-ninth Sts.; architect and builder, Wm. Kusche.

Second Ave., n w cor. One Hundred and Twenty-third St., five-st'y brick flat and store, tin roof; cost, $20,000; owner, John Walker, 233 East One Hundred and Thirteenth St.; architect, J. H. Valentine; builders, Walker & Galston.

Second Ave., w s, 25' 1" n One Hundred and Twenty-third St., five-st'y brick flat and store, tin roof; cost, $18,000; owner, architect and builders, same as last.

Fifth Ave., Nos. 26 *and* 28, 2 four-st'y brick and stone dwells., tin roofs; cost, $25,000; owner, J. H. Gautier, 30 Fifth Ave.; architect, H. J. Hardenburgh; builders, John Banta and Jean & Taylor.

Third Ave., Nos. 385 *and* 387, rear, three-st'y brick stable and workshop, tin roof; cost, $5,000; lessee, John Walsh, 206 East Twenty-eighth St.; architect, Jno. C. Burne.

One Hundred and Twenty-fifth St., s s, 150' e Eighth Ave., three-st'y brick store and hall, tin roof; cost, $7,000; owner, Wm. A. Martin, 128 West One Hundred and Twenty third St.

Seventy-third St., n e cor. Tenth Ave., four-st'y brick flat and store, tin roof; cost, $22,000; owners, Jonathan Allen, 335 Eighth Ave., and A. O. Rowe, 472 West Seventy-third St.; architects, D. & J. Jardine.

Seventy-third St., n s, 28' e Tenth Ave., 4 four-st'y brick dwells., tin roof; cost, $15,000; owners and architects, same as last.

East Seventy-fourth St., No. 209, four-st'y brick tenement and store, tin roof; cost, $10,000; owner, Catharine Irwin, 1274 Third Ave.; architect, S. A. Murphy.

Seventy-second St., s s, 400' e Tenth Ave., 5 four-st'y brownstone front dwells., tin roofs; cost, $25,000; owner, Margaret Crawford, 956 Third Ave.; architect, G. A. Schellenger.

Seventy-second St., n s, 300' e Tenth Ave., 3 four-st'y brownstone front dwells., tin roofs; cost, $20,000; owner and architect, same as last.

Ackerman St., e s, 38' n New York Central Railroad, 4 two-st'y frame dwells., shingle roof; cost, $2,173; owner, Euphenic S. Coffin, 13 West Fifty-seventh St.; architect, John Hunter; builders, McBride & Mulligan and John Hunter.

Seventy-sixth St., n s, 243' e First Ave., five-st'y brick factory, tin roof; cost, $16 000; owner, Simon Strauss, 179 Lewis St.; architect, John Brandt.

Sixth Ave., s w cor. Fifty-fifth St., four-st'y brick and stone club-house, plastic slate roof; cost, $150,000; owner, New York Athletic Club, 108 East Eleventh St.; architect, H. Edwards-Ficken.

Forty-second St., foot of, and *North River*, two-st'y frame ferry-house and offices, metallic shingles and tin roof; cost, $30,000; owner, West Shore and Ontario Terminal Co., 15 Broad St.; architect, H. C. Blanchard; builders, D. Van Orden & Co.

East Fifty-third St., No. 152, five-st'y brick tenement and store, tin roof; cost, $10,000; owner, John Casey, 204 East Fifty-first St.; architect, A. B. Ogden.

ALTERATIONS. — *East Broadway, No.* 102, attic to be raised to full st'y, four-st'y brick extension and internal alterations; cost, $5,000; owner, August Marshall, 242 East Seventy-second St.; architects, A. Pfund & Son.

East Twenty-seventh St., No. 332, raise one-st'y; cost, $3,000; owner, W. T. White, 130 East Thirtieth St.; architect, E. D. Garnsey; builders, Robinson & Wallace.

West Tenth St., No. 69, three-st'y brick extension, etc.; cost, $3,000; owner, Louisa J. W. Duffin, on premises; architects, Reutz & Wirz; builder, H. Reynolds.

Philadelphia.

COLLEGE BUILDING. — The Board of Trustees of the Dickenson College have adopted the plans of C. L. Carson, of Baltimore, for the new scientific building.

HOUSE. — At Thirty-sixth St. cor. Race St., residence for F. G. Thorne, Esq.; from plans by Wilson Bros. & Co., architects.

ENGINE-HOUSE. — Engine-and-boiler-house, for Philadelphia Water Department; plans by Wilson Bros. & Co., architects.

STORE. — B. F. Janney, Esq., proposes to erect at Nos. 121 & 123 Market St., a six-st'y store; from plans by Wilson Bros. & Co., architects.

BOAT-HOUSE. — Alterations to the boat-house of the West Philadelphia Boat Club; from plans by Wilson Bros. & Co., architects.

BANK BUILDING. — Third National Bank, Broad St. cor. Market St., extensions for additions of Safe Deposit Department; from plans by Addison Hutton, architect.

SOCIETY BUILDING. — At Thirteenth St. cor. Chestnut St., for the Historical Society of Pennsylvania, additions to the General Patterson Mansion of fire-proof and hall; Addison Hutton, architect.

FACTORY. — By Messrs. Jos. S. and Thos. Elkinton, at Eighth St., cor. Mifflin St., a four-st'y factory, 60' x 150', of stretcher bricks and brownstone; from plans by Addison Hutton, architect.

BUILDING PERMITS. — *Sixtieth St.*, s w cor. Market St., three-st'y dwell., 18' x 44'; Jacob Yell.

Seventh St., n w cor. Wharton St., 4 three-st'y dwells., one with store, 15' x 34'; H. R. Coulomb, contractor.

York St., s s, w of Richmond St., two-st'y warehouse, 18' x 77'; Edward Allen, owner.

Eighth St., e s, n of Berks St., two-st'y addition to boiler-house, 23' x 25'; J. C. Halderman, owner.

Trenton Ave., bet. Lehigh Ave. and Huntingdon St., two-st'y stable, 42' x 132'; W. Halloway, contractor.

Manheim St., w of Knox St., two-st'y dwell., 15' x 42'; W. Mackey, contractor.

Green St., No. 1919, new front and fourth-st'y on back building, 17' x 36' and 32' x 39'; B. F. Ketcham & Son, contractors.

Chestnut St., No. 1344, four-st'y brick building, 20' x 42'; R. G. Black, contractor.

Centre St., n s, e of Thirty-seventh St., 2 two-st'y dwells., 12' x 30'; A. F. Brown, owner.

Lehigh Ave. cor. Marshall St., carpet factory, main building, 52' x 146', two-st'y office, one-st'y weaving room, one-st'y sizing room, etc., 51' x 208', and boiler room and engine-house, 40' x 152'; J. S. Steel, contractor.

Second St., e s. bet. Susquehanna Ave., and Diamond St., 10 three-st'y dwells., 16' x 44'; Chas. Bassart, contractor.

Walnut St., No. 939, four-st'y store and dwell.; Merriner & Buckingham, contractors.

Race St., No. 1109, three-st'y store and dwell., 18' x 32'; Geo. F. Payne & Co., contractors.

Frankford Creek, cor. Ashton St., three-st'y addition to factory, 36' x 50'; Jos. P. Yelkes, contractor.

Otis St., cor. Siloam St., three-st'y dwell.; A. T. Richards, contractor.

Nineteenth St., n s, s of Dickenson St., 2 two-st'y dwells., 16' x 40'; M. B. Stackhouse, contractor.

Frankford Ave., e s s of Allegheny Ave., two-st'y dwell., 18' x 50'; Dickson Bros., contractors.

Lehigh Ave., No. 1018, three-st'y brick building, 14' x 33'; H. W. Householder, owner.

Lawrence St., s of Girard Ave., two-st'y engine-house, 28' x 40'; Jos. McGavery, contractor.

St. Louis.

BUILDING PERMITS. — S. Prag & Bro., two-st'y brick dwell.; cost, $3,200; A. Dietz, contractor.

David Goss, two-st'y brick dwell.; cost, $3,800; J. B. Legg, architect; Philip Riechers, contractor.

Mrs. U. I. Paul, two-st'y brick dwell.; cost, $10,000; Jas. A. Conlon, contractor.

O. M. Schmid, two-st'y brick dwell.; cost, $4,000; Fred. Offerman, contractor.

F. Ryan, two-st'y brick dwell.; cost, $2,700; McNamara, architect; J. J. McMahon, contractor.

Terrence Martin, four-st'y brick dwell.; cost, $7,000; McNamara, architect; O'Malley Bros., contractors.

Geo. H. Bruggeman, two-st'y brick dwell.; cost, $4,600; Beinke, architect; E. T. Hoffman, contractor.

R. P. Hannekamp, three-st'y brick dwell.; cost, $6,500; J. G. Cairns, architect; sub-let.

F. W. Barkhoefer, two-st'y brick dwell.; cost, $5,700; Wm. Kerksieck, contractor.

R. Bozman, two-st'y brick dwell.; cost, $3,100; T. Furlong, architect; Whiting & McNamee, contractors.

J. Lahey, two-st'y brick dwell.; cost, $3,750.

St. Louis Mutual House Building Co. No. 3, two-st'y brick dwell.; cost, $5,500; Mortimer, architect; Bothe & Ratheman, contractors.

Wenzel Stephen, two-st'y brick dwell.; cost, $2,600; F. Mueller, contractor.

General Notes.

CHAPPAQUA, N.Y.—Daniel G. Boyd has been awarded the contract to build a new Orthodox meeting-house.

GENEVA, ILL.—The contract for the Kane County hospital for the insane has been awarded to Barker & McMaster, of Batavia, for $12,000.

LAWRENCE, L. I. — Two brick and frame cottages, 40' x 60' each, are to be built for Mr. Baker, at a cost of about $20,000; from designs of Mr. H. Edwards-Ficken, of New York.

LITTLE FALLS, N. Y.—Bishop Wigger, of the Newark Diocese, laid the corner-stone of a new Roman Catholic church, September 2.

MEDIA, PA. — Cottage for Frank P. Weaver, Esq.; plans by Wilson Bros. & Co., architects, Philadelphia.

MILWAUKEE, WIS.—The unfinished Passavant hospital at Milwaukee which was destroyed by fire, August 14, is to be rebuilt.

NEW BRITAIN, CONN. — The Russell & Erwin Manufacturing Co. are having plans prepared for a new office-building, by Wilson Bros. & Co., architects, Philadelphia.

NORTHAMPTON, MASS.—Horace Lamb, of Northampton, is to rebuild his wire mills about the size of the old building, and of brick.

OYSTER BAY, N. Y. — Mr. Robert Roosevelt has purchased 100 acres of land at Oyster Bay Cove, adjacent to the Sound, for $30,000. It is said that Mr. Roosevelt represents a syndicate which will spend $100,000 in building summer residences.

PATERSON, N. J.—Kearney & Foot, of New York, are building new file shops here.

PLAINFIELD, N. J. — A stable, 29' x 60', brick, stone and wood, is to be built for Mr. J. E. Tracey; from designs of Mr. H. Edwards-Ficken, of New York.

RIDLEY PARK, PA.—Cottage for Chas. H. Savage, Esq.; Wilson Bros. & Co., architects, Philadelphia.

ROSEMONT, PA. — House and stable for Jno. B. Garrett, Esq., of native stone; plans by Addison Hutton, architect, Philadelphia.

ST. PAUL, MINN.—A six-st'y hotel will be constructed on Roberts St., St. Paul, Minn., of which J. J. Egan, of Chicago, is the architect. It will have a frontage of three hundred feet, contain about three hundred rooms, and cost $1,000,000

SOUTH FRAMINGHAM, MASS. — The Congregationalists of this village, who have commenced the erection of a $17,000 church at the corner of Union Ave. and Pearl St., laid the corner-stone August 31.

STAFFORD SPRINGS, CONN.—Work has begun on the worsted yarn mill of the Warren Woollen Company.

THORNDALE, PA. — Chas. L. Bailey, Esq., is about to make extensive addition to his country house; plans by Addison Hutton, architect, Philadelphia.

WOLFEBORO, N. H.—F. W. & I. M. Munroe and J. W. Cropley, shoe manufacturers of Marblehead, Mass., are building factories here.

LATEST.

Brooklyn.

BUILDING PERMITS. — *Warren St.*, s s, 330' 9" w Smith St., four-st'y brownstone flat, tin roof; cost, $10,000; owner, Owen McGreevey, 168 Court St.; architect, F. E. Lockwood; builders, W. H. Hazzard's Sons & Co.

Tompkins Ave., n e cor. Stockton St., two-st'y and basement frame dwell., tin roof; cost, $3,500; owner, Samuel Eden, Tompkins Ave., cor. Park Ave.; architect and builder, N. M. Whipple.

Freeman St., s s, 25' w Oakland St., three-st'y frame tenement, gravel roof; cost, $3,000; owner, Ellen Cammal, on premises; architect, J. Mulhault; builders, J. Haffer and Randall & Miller.

Fifth Ave., e s, 100' s Fourteenth St., three-st'y brick store and tenement, tin roof; cost, $4,500; owner and carpenter, Wm. A. Hatfield, Sixteenth St., cor. Tenth Ave.

Johnson Ave., s s, 125' e Union Ave., four-st'y brick factory, gravel roof; cost, $6,500; owner, Louis Bossert, 6 and 8 Union Ave.; architect, J. Platte; builder, J. Auer.

Fifth St., e s, 22' s North Sixtieth St., three-st'y frame store and tenement, tin roof; cost, about $5,000; owner, Wm. T. Dailey, 139 Grand St.; architect, F. Holmberg: builder, not selected.

Brevoort Pl., s w cor. Bedford Ave., 2 three-st'y brownstone front dwells., tin roofs; cost, each, $8,000; owner and builder, Benj. Linikin; architect, A. Hill.

Harbeck Pier, Furman St., between Wall and Fulton Ferries, one-st'y frame freight-shed, gravel roof; cost, $7,000; owner, W. H. Harbeck, 81 Beaver St., New York City; architect and builder, W. H. Hazzards Son & Co.

Eleventh St., e s, 26' n South Third St., three-st'y brick tenement, tin roof; cost, $4,000: owner, Mathias Burggraf, Eleventh St., cor. South Third St.; architect, J. Platte; builders, M. Smith and J. Frisse.

Hart St., n s, 90' w Throop Ave., 3 two-st'y brownstone front dwells., tin roofs; cost, each, $4,000; owner and builder, S. C. Phillips, 691 Lafayette Ave.; architect, A. Hill.

Fourth St., s s, 22' 4" w Hoyt St., three-st'y frame tenement, tin roof; cost, $2,950; owner, P. Ferguson, Fourth St., near Hoyt St.; architects and builders, M. Freemans' Sons.

Sullivan St., n s, 100' w Richards St., two-st'y brick tenement, tin roof; cost, $3,550; owner, John Adams, 184 Partition St.; architect and builder, L. Bonert; mason, T. Shanley.

Bids and Contracts.

PHILADELPHIA, PA.—The contract for supplying the new United States court-house and post-office building with chandeliers and gas fixtures was awarded to Messrs. R. Hollings & Co., Boston, Mass., whose bid ($10,818.75) was the lowest. The other bids were as follows: —

The Archer & Pancoast Manufacturing Company, New York, $17,411.75.

Cornelius & Co., of Philadelphia, $16,113.

Cornelius & Co., of Philadelphia, $13,465.40.

Gibson, De Kosenko & Co., of Philadelphia, $11,832.75.

Horn, Pfeffer & Branner Manufacturing Company of Philadelphia, $17,260.05.

Mitchell, Vance & Co., of New York, $16,365.50.

CLIFTON, O. — The following contracts have been awarded for the Presbyterian Church; Mr. A. C. Nash, architect, Cincinnati.

Limestone, Owens & Co., $7,147.

Brickwork, J. G. McGarvey, $673.

Carpenter-work, Mackey & Wells, $4,000.

Plastering, E. Merring, $500.

Painting, Heatley Brothers, $414.

Roofing, Chris. Kiechler, $1,100.

Plumbing and gas-fitting, Gibson & Co., $275.

COMPETITION.

CITY-HALL.

[At Richmond, Va.]

RICHMOND, VA., September 1, 1883.

The time for receiving designs for City-Hall has been extended **to November 1, 1883.**

W. E. CUTSHAW,
City Engineer.

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PROPOSALS.

PASSENGER STATION.

[At Chicago, Ill.]

OFFICE OF THE CHICAGO & WESTERN INDIANA R. R. Co., CHICAGO, Aug. 28, 1883.

Sealed proposals directed to the undersigned, and endorsed "Proposals for Passenger Station Work," etc, will be received at this office **on or before the 12th day of September, at 12 o'clock.** M., for the mason-work, carpenter-work, iron-work, slating, steam-heating, painting, plumbing, etc., for a new passenger depot to be built for this company at the corner of Third Ave. and Polk St., Chicago. Proposals are to be made for each branch of the work enumerated above, and are to be accompanied with bonds in two sureties each to one-half the amount of the bid.

Said sureties are to guarantee that the bidder will enter into a contract if it is awarded to him, and further, that the bidder will perform the contract to its completion in accordance with his agreement and the plans and specifications. Plans and specifications can be seen at the office of the architect, No. 94 Washington St., Room 30, from 9 A. M., till 5 P. M., from the 28th day of August until the 12th day of September.

The undersigned reserves the right to set aside any or all bids.

S. R. CALLAWAY,
President.

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XIV. Copyright, 1883, JAMES R. OSGOOD & Co., Boston, Mass. No. 403.

SEPTEMBER 15, 1883.

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THE work upon the Indiana State-House, which was virtually suspended for a time after the discovery was made by the contractors that they could not finish the building for the price agreed upon, is, according to the *Commercial Gazette*, to be resumed at the expense of the bondsmen of the contractors. It will be remembered that the latter made their price for the work at a time when wages and materials were low, and the sudden rise in both which took place two years ago not only swept away their profit, but involved them in losses, which continually increased as the building went on, and it was not until their property had been exhausted in making up the difference between their receipts and their expenditure that they appealed to the State-House Commissioners, and through them to the Legislature, for a modification of the contract, by which they might be paid the actual cost of carrying on the building. The contractors offered to give their own time and skill to the State, without pay, until the completion of the work, provided they could be relieved of the necessity for involving themselves still further in debt. We expressed at the time a hope that the Legislature would be magnanimous enough to consider it unworthy of a great State to take advantage of the mistakes of its citizens, and would accede to the contractors' modest petition, but, no doubt for good reasons, it decided otherwise. For some months it seemed uncertain whether the terms of all the agreements were drawn with sufficient skill to hold the contractors and their bondsmen strictly to their promises, but after what we may presume to have been a diligent search for loopholes of escape, the expectation of finding any appears to have been abandoned, and as the contractors' money is entirely gone, the sureties must, to save themselves from a forfeiture of their whole bond, complete the building themselves.

THE struggle between the managers of the Amalgamated Building-Trades Union, in New York, and the master-builders, has continued during the past two weeks without much change, the contractors generally remaining firm, and, if anything, gaining a little, while the Union dictators have grown more and more unscrupulous in their efforts to coerce their opponents and their own subjects. Our readers will remember that Mr. Power, the plasterer at the Dakota apartment-house, was placed under the ban of the Union for refusing to discharge two of his men who declined to join it, and will also recollect that, finding him disinclined to submit to their orders, the delegates of the Union applied to the trustees of the estate which owns the Dakota building, threatening to call out all the men from a row of houses building not far off for the same estate, but by different contractors. The trustees of the estate happened to be gentlemen of honor, and declined to be used as cat's-paws for coercing free citizens, and the delegates thereupon called out every Union man at work upon the buildings belonging to the estate. For two weeks the houses remained deserted, but at the end of that time signs of discontent showed themselves among the men who had so meekly laid down their tools at the word of command. A society of German framers, as might perhaps have been expected, was the first to rebel, and resolved in full meeting to notify the Executive Committee of the Amalgamated Union of their intention to resume work; and the next day the members of the society who were employed on the buildings of the proscribed estate returned to their task. With them came also a number of members of the Tin-Roofer's Union, actuated by similar motives, and justifying their disobedience on the ground that the strike, which was ordered solely for effect upon contractors and men in another building, was unfair and wrong.

IT is very evident, as the contest progresses, that a little more courage on the part of the contractors would have secured for them an easy victory. The Executive Committee of the Amalgamated Union, notwithstanding the stringent oaths and enormous penalties by which they bind their victims, cannot drive those who have families to support beyond a certain degree of compliance, and their success in ordering large bodies of men to drop their work at their bidding depends very much on their ability to find employment for them elsewhere. For this reason the attack is made only upon one or two contractors at a time, and a week or so ago, the burden having evidently become rather too heavy to be handled, a "compromise" was undertaken with the contractors for a large building, by which the men might continue at their work. Such "compromises" would quickly have become the rule if other contractors had emulated the manliness of Mr. Power and Mr. Tucker in befriending their non-Union workmen, and the first strike would probably have been the last. As an expedient for distressing contumacious contractors, without assuming the burden of finding work for men called out on strike, the indefatigable managers of the Amalgamated Union have recently hit upon the idea of inducing Messrs. Eidelmeyer & Morgan, the proprietors of the admirable little hod-elevators now much used in New York and other places, to remove their apparatus from buildings where a strike had been ordered by them. The firm is said to have been threatened, in case of refusal, with the ordering of a general strike in all buildings where its elevators are in use. It is very unlikely that this threat would be carried out, but the transaction sufficiently shows the malicious ingenuity of the men who exercise such absolute authority over a large part of the population of New York.

AT a recent conference between the Executive Committee of the National Association of Master-Plumbers and a number of manufacturers and dealers in plumbing material a remark was made in relation to price-lists of such material, by one of the best and most sensible plumbers in the United States, which we commend to the attention of every person interested in the subject. After referring to the absurd method of preparing price-lists and catalogues now used, in which there is no relation whatever between the list prices and those deduced from the discount-sheet, the speaker went on to urge the adoption of a rational plan by which the net and the "long" prices should be placed in some sort of proportion to each other, saying that such a system would conduce to the interest of the plumber, and would promote more amicable relations between him and his customers. We are glad, from the architect's standpoint, to confirm this opinion in the strongest manner. With all our good will toward the most useful, as well as the most scientific of all the trades concerned in building, we must confess that we never see a plumber's bill for what is ostensibly a day's work job, containing items of materials charged by the list price, at a profit to the plumber of one, two or three hundred per cent over the net cost, without a conviction that the Plumbers' Association need not look far for one of the reasons of that public contempt and dislike of which it took early occasion to complain. Nor do the careful concealment of the discount-sheets by dealers in materials from all but plumbers, or the anathemas of the trade associations against all dealers who sell goods to the consumers without their intervention, tend to increase our confidence in the honesty of those who desire to resort to such expedients; on the contrary, we can say, for ourselves at least, that the more assiduously the discount-sheets

are hidden away by the dealers, the greater is the effort which we make to obtain them, or, failing that, the more rigidly do we exercise our judgment and experience in cutting down the list prices on plumbers' bills to such as will afford a fair and honest profit.

THAT a plumber is entitled to a reasonable profit on the materials which he keeps and handles we do not for a moment deny, but no one can charge his unsuspecting customers with a profit of two hundred per cent, or can even show a desire to put himself in a position for making such profits without detection, and retain his reputation as a man of honor and integrity. Plumbers will understand what we mean, but for the benefit of those who are not plumbers we will cite the example of a bill which we had the pleasure of examining a few years ago, in which a considerable amount of iron pipe and fittings, among other items, was charged at the list price. Iron pipe was cheap at the time, the discount being seventy per cent, so that the profit on that portion of the bill alone was, or would have been if it had been paid, two hundred and seventeen per cent. No doubt the plumber thought he was simply following the custom of the trade in making out his bill in this way, and in fact, judging from our experience, he was; but the reason for mentioning this particular case is that the person for whom the work was done, taking the view of this method of doing business which, when its peculiarities are pointed out to them, we have found most people, not in the plumbing trade, to adopt under similar circumstances, forthwith transferred his confidence, and with it a jobbing business of eight thousand dollars a year, to a plumber who was willing to show how he earned his money. That other plumbers will, as General Locke says, find a fair and open system of profits and charges in the end the best for them, as it has been found to be for every other trade, we are firmly convinced, and we can moreover assure them that until they abandon their secret discount-sheets, and cease their screams for "protection" from dealers, to adopt such a system, they must be content to remain objects of distrust on the part of the community, and the butt of the silly wit of those who only express that distrust.

ONE of the ablest sanitary and drainage engineers in the world is now Sir Robert Rawlinson, baronet, the Queen having been pleased to confer that rank upon a man who has well earned it. Although thus honored by a recognition which falls to the lot of few professional men in England, Sir Robert Rawlinson owes nothing of his success to circumstances or connection. Brought up to the humble trade of a stonemason, his passion for acquiring and using knowledge led him, after many years of application, to a high rank among engineers, and in 1848 he was appointed Engineering Inspector under the first Public Health Act. In performing the duties of this office he visited and examined every important town in England, and seven years later, on the breaking out of the Crimean War, he was sent to the Black Sea as the engineer member of the famous Sanitary Commission. The work done by this Commission will be remembered as long as sanitary science is studied, and from that time Mr. Rawlinson has been constantly in the public service. In 1863 he was sent as Commissioner to Lancashire to devise modes of employment for the distressed mill-operatives of that district, thrown out of employment by the blockade of the Southern ports during our civil war, and under his care an immense amount of road and sewer building, paving and drainage, was executed for the Government by the poor cotton spinners and weavers. Since then his attention has been constantly occupied both with public and private business, and even now, at the age of seventy-three, his influence in the profession is as extended, and his enthusiasm for progress as sincere, as at any period of his life.

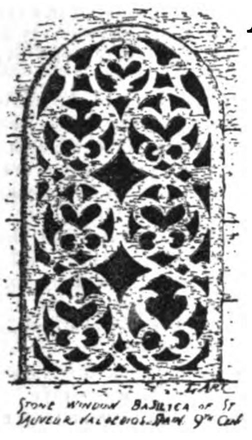
THIS is the season of "recompenses" in the French School of Fine Arts, and the award of the grand prize has just been made. The subject assigned was a "necropolis" for the burial of the founder of a great state; and the first grand prize was awarded to M. Fernand Redon, pupil of M. André. The second grand prize was given to M. Léon-Eugène Quatesous, pupil of M. Pascal; and the third to M. Alphonse-Alexandre Defrasse, pupil of M. André. Among the lesser prizes, the grand "medal of emulation," given to the student in the school who has received the greatest number of honorable mentions during the year, was awarded, in the department of architecture, to M. Duret, pupil of M. Guadet; and the "Prix Abel Blouet," for the student in the first class in architecture who has maintained the highest standing since his entrance into the school, was given to M. Devienne, pupil of MM. Coquart and Guérard. The "Prix Jay" for construction was awarded to M. Lechevallier, pupil of M. Guadet; and another pupil of the same distinguished architect, M. Duray, obtained the first "Prix Jean Leclaire," for general excellence during the year, while the second prize of the same name, awarded to the student passing in the shortest time from the second to the first class, was carried off by M. Pillette, pupil of M. André.

THOSE architects who may be called upon to design buildings for New York should take notice that hereafter no bay or oriel window, projecting beyond the building-line of the street, can be constructed under any circumstances; and plans submitted to the Bureau of Buildings, which show any such projections, will be at once rejected. This will be bad news for those who expect to live in the apartment-houses of the future. Hitherto, the designers of such buildings have availed themselves to the fullest extent of the regulations permitting the projection of bay-windows into the street, and many pleasant apartments are in consequence rendered still pleasanter by their outlook up and down the length of Fifth or Madison Avenues. Of course, those now built will not be affected by the change in the law, and their owners will value all the more their monopoly of a charming feature in city dwellings.

A CORRESPONDENT of the New York *Sun* writes from Florida a sharp criticism upon the proposition for cutting a canal across the upper end of that peninsula. The cost of making the canal he considers to have been very much under-estimated, and believes that it would amount to two hundred and fifty millions of dollars, while its value to navigation would be very small. The distance which such a canal would save coasting vessels in the voyage between the Gulf ports and the North he estimates at from three hundred to five hundred miles, but the time consumed in the passage through the canal, with that required for entering port at one end, and leaving it at the other, would be more than that necessary for taking the longer route, while the cost of towage, the canal tolls, the port dues at each end, pilotage and insurance, would far exceed the saving made by shortening the distance sailed. The dangers of the Florida reefs, which the canal route would avoid, the *Sun* correspondent believes to have been greatly exaggerated. It is true that many vessels have been lost upon them, but he asserts that a "vast number" of these have been intentionally cast away by their dishonest captains or owners for the sake of the insurance money and a share of the salvage. It is hardly possible for any one not intimately acquainted with the circumstances to judge of the correctness of these opinions, but it would at least be worth while to make further investigations before much money is spent on the work.

FOR some reason, the luminous paint made and used in England seems to be of a much more brilliant quality than that sold here. Several of the railway companies on the other side of the Atlantic have tried it for painting the roofs of tunnels, and a car on the South-eastern railway is said to have been recently painted with it inside. A good coat was given to the walls and ceiling, and the light emitted from it is said to have been so bright that the passengers were able to read by it while passing through tunnels. As the sudden change from daylight to shadow on entering a tunnel adds tenfold to the apparent darkness of such places, an artificial light capable of dispersing such gloom must indeed be bright, and if the luminous paint can really accomplish the result claimed for it, a simple coat of it, without expense for renewal or attendance, would be superior, for lighting railway trains, to any lamps now in use for that purpose. Another common application of the paint abroad is in making luminous lettering upon guide or sign boards, and from our own experience of a wall painted with it which, after the lapse of two years, still shines at night as brightly as ever, we should suppose that it might be very well adapted for such illuminating tablets in a sheltered position. In country towns, for instance, where street lamps, if used at all, are extinguished at midnight, the cost of an application of luminous paint to the guide-boards would be trifling, and its advantages very considerable.

PRESIDENT WALTER'S ANNUAL ADDRESS BEFORE THE A. I. A.



FELLOWS AND ASSOCIATES:—
In pursuance of the resolve of the last Annual Convention, we find ourselves to-day in the historic home of a people whose names will never die. Around us are scenes that move the noblest instincts of our natures, as they carry us back to the founders of this time-honored State — a State that has given to all parts of our country men of sterling worth, whose names have continued to be household words through more than two hundred years, among whom that noble champion of soul liberty, Roger Williams, stands conspicuous. Under the shadow of these ever-abiding influences we do now congregate.

More than a quarter of a century having elapsed since our present organization was effected, it will be interesting to notice the tendency of architecture to a formative condition in this country, during these early years of our corporate existence, and to observe the progress we have made in developing the possibilities of our art. Previous to the year 1857 there were no specific bonds of union between American architects, nor any tendency to cultivate professional relationship, other than that which naturally results from the pursuit of a similar occupation. It therefore became self-evident that the formation of a guild or a society for the promotion of mutual intercourse and the advancement of professional knowledge constituted a necessary accessory to progress in the development of the principles that govern architecture.

Moved by these considerations, the American Institute of Architects was duly constituted on the 19th of February, 1867, and incorporated on the 4th of March of the same year. Having been thus organized by our own action and by the civil law, it becomes us to hold ourselves ever ready to promote the objects for which we have associated by using our best efforts to extend the usefulness of our organization throughout our membership, and by employing all proper means to promote in the public mind a just appreciation of the civilizing and refining influences that result from a successful practice of our art. It is therefore important to the profession that a closer intercourse be cultivated throughout its membership, and that such measures be adopted from time to time as may give stability to our calling. To accomplish these objects and to record a more perfect organization, as well as to increase the influence and power of the Institute, we first met in annual convention in October, 1867, and we have continued to hold similar meetings annually, with the exception of two years. These meetings have proved to be of incalculable service in promoting the advancement of architectural science in all centres of civilization throughout the country.

Being now about to enter upon the celebration of another annual Convention, with an additional year's experience, we are not without fresh subjects for profitable discussion; let us therefore give expression to a free interchange of thought in whatever may come before us bearing upon our art and the sciences that underlie it.

We must bear in mind that knowledge is accumulative, that we all know more than we did a year ago, that every one of us has some added wisdom to impart. We have all been moving onward in the pursuit of our calling, realizing fresh achievements to the domain of architectural development, and are well prepared to give life and vigor to the Convention.

We have labored, as before remarked, in a corporate capacity more than a quarter of a century, and are not without evidences in every portion of our country that "we have not labored in vain, nor spent our strength for nought." The building community is undoubtedly imbued with juster conceptions of the sciences on which our art depends for its stability, its permanency and its possibilities, than it ever was before, and the noble sentiments that bring the creations of well-studied architecture into the realm of the fine arts are ever inspiring the cultivated mind with refining and elevating emotions of beauty, proportion and propriety.

Critics, whose appreciation of the beautiful in art is limited, and whose habits of thought are crude and unscholarly, are occasionally to be met with, who contend that architecture is not a *fine* art, but simply an aggregation of the *mechanic* arts. It is, however, obvious, upon the slightest reflection, that so far from architecture being outside of the category of the fine arts, it embodies the sentiments of all of them:— though not aiming at any real, or positive imitation of natural objects, imitation, in a limited sense, comprises some of its principal charms — it expresses, by means of material forms and proportions, the moral qualities indicated by nature, thus resting its powers to awaken agreeable emotions of taste, on its own rational and original principles.

In the words of Addison, "Architecture is an art, more than any other, that is capable of directing national taste. As a fine art its immediate tendency is to produce the primary pleasures of imagination, and is therefore capable of laying hold of the mind." Vitruvius opens his work on art by stating that "Architecture is a science by whose principles all works which are effected in other arts are examined." A closer analytical study of the relations of architecture, as a fine art, to other arts of the imagination would no doubt result in greater purity of design.

I now ask your attention to a few suggestions in reference to the present *status* of the Institute. We found by experience that the vast extent of our country renders it difficult to impart a desirable degree of vigor and efficiency to a National Association of professional architects. This difficulty has, however, been in a measure overcome by the organization of Chapters in some of our large cities; and if these useful adjuncts to the Institute could be rendered more efficient by greater activity, and their number increased, the usefulness of our organization would be greatly enhanced, and its intellectual force as an educator of the public mind be promotive of the advancement of all that relates to the comforts and the conveniences of human life, and of the harmonizing influences of the beautiful in art, by which the sphere of intellectual enjoyments is elevated and purified.

Having at the beginning of our corporate existence resolved ourselves into a scientific and professional body of a national character, it is proper that we should seek to realize our earliest thoughts in this direction by bringing into professional relationship with us, as far as may be practicable, all architects in good standing throughout the country. To impose onerous conditions, and unnecessary checks to the admission of members, and to invest the processes of election with too much "red tape" would undoubtedly circumscribe our influence and interfere with the good we might otherwise accomplish. If every respectable practitioner in the United States, who is honorably pursuing the practice of architecture, were to-day a member of this Institute, we would be none the worse for the connection, and he would undoubtedly be all the better for it. The addition of minds well trained in the profession, broadens its influence on the public taste, and enlarges its sphere of knowledge and of usefulness.

Important changes in our by-laws, relating to the admission of members, will be laid before you by a special committee appointed for that purpose at the last Annual Convention, and such conclusions will no doubt be arrived at, as will tend to the best interests of the Institute in that direction.

I take occasion to remark, in conclusion, that the unlimited freedom that characterizes the composition of architectural forms, at the present day, demands a far greater amount of study, and a higher degree of cultivation in the perception of the beautiful in art, than ever existed in the past.

The simple and artistic forms of the pagan world have yielded to the inspiration of a higher civilization. The fetters that held architectural forms to classic models for centuries have been broken, and the fact has become patent, that progress is the life blood of architecture.

Mediæval art, glowing with the benign influences of Christianity, emancipated the processes of design from the trammels of formulated methods, and led to the subsequent development of the beautiful creations of the later Gothic school, which still claims our highest admiration, and our profoundest study.

By tracing the mental processes by which the human mind has been led onward, from the first rude attempts of our race, to impress an artistic character on the art of building, up to the highest architectural developments of the present day, the student is prepared to abnegate all conventional trammels; and in view of the treasures of the past, laid at his feet by an exhaustive literature, he has acquired the habit of thinking for himself.

PLUMBING AND HOUSE DRAINAGE.

SO many changes have been rung upon the scale that it is difficult not only to say anything new about house drainage, but to say old things in a new way. The only justification for further reference to the matter, save for a few recent modifications, is to be found in the injunction "Line upon line and precept upon precept."

While the community is much exercised concerning sewerage and house drainage, and while the subject is one of interest and of frequent discussion, it is thus far very imperfectly "formulated" in the public mind. All are agreed that their towns and their houses should be well drained; bad sanitary condition is a universal bugbear; ailments of all sorts are eagerly ascribed to mechanical sanitary defects, and zymosis is the fetich of the day. Despite all our enthusiastic conviction, however, we are willing to make but little sacrifice to secure immunity from what we so greatly apprehend; we prefer to eat our cake, and have it too.

It is not possible, in the present state of the art of house draining, to have a stationary wash-stand in every bedroom of the house, a bath, sitz-bath, water-closet, urinal and wash-stand in each of the several bath-rooms on every floor, to have a slop-hopper in every dark closet, with sinks and laundry-trays, and servants' closets scattered here and there at whim, and at the same time to protect the household against all of the possibilities of "bad drainage." A most important

step in sanitary reform is to be sought in the subjection of house-building fancies to sanitary security. In this case "security" is very largely a synonym of "simplicity." It is convenient, of course, to have water-supply and waste-pipe at every turn, but here an excess of convenience is to be purchased only with an increase of risk. In old houses, which are to be altered, or into which drainage works are to be introduced, it is not always easy to bring plumbing within a compact and easily-inspected compass. Pipes must pass through rooms and passages where they must be covered from sight, and under floors where they must be covered for convenience. Long horizontal runs are not always to be avoided, and generally we are reduced to make the best of a bad job. In this case, especially, the judicious builder will hold a firm rein on the desire for a luxurious diffusion of conveniences.

The architect has, as a rule, not been a leader in sanitary reform. He is sometimes too slow to give up his old habit of leaving the details of plumbing arrangements to the plumber. Though not the first to move and though still slow, he is now beginning to realize that, in addition to his other multifarious and important duties, he must, in response to a growing popular demand, and in obedience to better understood requirements, take an immediate and direct control of at least so much of the plumbing as relates to the removal of waste matters from the house. Those engineers who have devoted themselves to sanitary drainage have been, and still are, almost as useful as they have been aggressive, but their most important office relates to the creation and direction of public opinion, leading to a demand for improved methods, and for improved control on the part of architects and plumbers. Our best hope for universal reform must depend almost entirely on this; a professional sanitarian will not be consulted in one case in a thousand, nor will his advice be followed, without the approval of the architect and plumber, in one case in a hundred. He has performed very well — one is almost tempted to say over-well — his duty of arousing popular apprehension. His future useful influence will be largely exerted in calling attention to matters of detail, and in marking out the general lines which the architect and the plumber are to follow. In this work, as in that which he has thus far done, he must look for the means of enforcing his teachings to the apprehensive intelligence of those for whom houses are to be built or remodelled. There are several principles which should always be kept in mind. These have become so trite that one almost hesitates to restate them. They are, however, these: —

The production of waste is an inevitable incident of human life. The excretions of the person, the discarded portions of food, the water of ablutions and of the laundry, and the various organic dust and offal of the household are all of them liable to become a nuisance dangerous to life unless properly removed. They are rarely dangerous when first produced, but they become increasingly dangerous and offensive as they enter into the decomposition which is the fate of all discarded organic matter.

This refuse must, in one way or another, be removed before decomposition develops its power for mischief. Whether the rough garbage of the kitchen, the drippings of the sink, or the dejections of the body, all must, in one way or other, be sooner or later removed from our presence — the earlier and more completely the better. It is hardly worth while to occupy time in the enforcement of this general principle; it is worth while to call attention to the fact that there can be no perfect sanitary condition unless removal is not only prompt but complete. Within certain limits it is true that filth is objectionable in proportion to its volume, but very limited volumes may become pernicious, and even such traces of filth as adhere to the walls of receptacles and of outlet chambers have sufficient capacity for mischief to command careful and serions consideration.

In applying these remarks to existing domestic conditions we shall be justified on this occasion in confining our attention to houses which are to be provided, with reasonable completeness, with what are known as "modern conveniences." So far as garbage is concerned it is enough to say that there has been thus far no general adoption of a civilized method for its removal.

When we speak of the drainage of a house, or of its sanitary condition, we generally have in mind the manner in which it is relieved of such of its waste matters as can be transported in running water, and it will suffice now to consider the methods by which such removal may best be carried out, including in our review the character of the receptacles into which the wastes are discharged, whether sinks, slop-hoppers, or water-closets. Regarding the waste-pipe, the first and simplest rule is that it should be of such material and so constructed that it will permanently carry away all water that may reach it. This has always been understood. The next is that the joints of this conduit should be secure, not only against the leakage of water but equally against leakage of air. This rule has been understood theoretically for a good while, but practically it is rarely adhered to. I have tested few soil-pipes, under a head of water, in which leaks through imperfect joints have not been developed.

The interior of the conduit should be as nearly as possible in the same atmospheric condition as the air outside of the house, that is to say, there should be a constant circulation to facilitate the rapid decomposition of the inevitable sliming of the walls, and the immediate dilution and removal of the gaseous products of such decomposition. In working toward this condition we first carried up small vent-pipes from the tops of our soil-pipes; later, we continued the pipe full bore to the top of the house; later still, we introduced a supply of fresh air at the foot to maintain a complete circulation; and last of all we enlarged the soil-pipe at its top to increase the draught.

As with the conduit itself, so with the receptacles and connecting-pipes leading to it. These should be sufficiently ventilated in every part, and all closets, and sinks of every sort should be so freely exposed to the open air that no suspicion of "closeness" can ever attach to them.

At every point the water used for the transportation of the wastes that are to pass through our pipes should be used in the most effective way. A thread of water running from an imperfect faucet is practically of no value whatever. It follows a narrow and uncertain course along the side of the soil-pipe or drain with no power to wash its general surface, and with no power to remove accumulations. It is pure and unadulterated waste. Incidentally it may be said that in very many houses its total volume is far greater than that of all of the water *used*, and that in many towns, including New York city, the aggregation of these ineffective dribblings is almost the sole source of insufficient water-supply. It is hardly practicable under any ordinary head, especially on the upper floors of houses, to deliver into a water-closet, or into a slop-hopper or sink, a sufficient *stream* of water to secure the efficient cleansing of its waste-pipe. It is in this direction that one of the most important of modern reforms is being exerted, working rapidly toward a most effective improvement on the whole practice of house drainage. The watchword of our best present movement is the word "flushing!" It will not be long, we may be sure, before it will be universally understood that, after pipe ventilation, the great secret of good drainage lies in the use of abundant volumes of water delivered in a mass along with each contribution of filth. A perfect system of drainage and water-supply would be one where at all ordinary times not a drop of water flowed through the outlet channels, only occasional dashes of several gallons lubricating the walls of the pipes, and carrying along completely and with velocity substances which, under the old system, smeared their sluggish road along the pipe, and left material for infectious decomposition at every step.

However perfect may be our channels, and however complete and instantaneous may be our flushing, we see as yet no way, nor are we likely to see a way, by which the insidious effect of the slight local decomposition within the drainage channels may be entirely obviated. Even were it obviated by the application of devices of which we as yet have no knowledge, there would still attach to our drains at least the suspicion of unpleasantness. For this reason our receptacles of waste matter must be sealed or shut off from the interior drainage system by the most perfect and continuous means of separation that can be secured. Here is a point on which I find myself, unfortunately, at variance with most of the authorities, and I confess that while I have little faith in the almost universal specific of trap ventilation I am by no means clear as to the best substitute for it in all cases — only clear that a substitute must be found. In my opinion, all that we can safely say is that in one way or another, either by a permanent and secure water-seal of good depth, or by the interposition of mechanical obstacles to the return of the air of the drain, we must manage in all cases to separate the air of the soil-pipe from that of the interior of the house. While no universal recipe can be furnished for this, there is no case in which, by one means or another, the desired result cannot be obtained.

In the foregoing review of the requirements of a properly constructed drainage system we have an indication of all that it is absolutely essential to compass. In the treatment of the various points referred to the cardinal rule of *great simplicity* should ever be borne in mind. Drainage works may be introduced into a house in such a manner as to be to all intents and purposes absolutely safe. The shade of apprehension which they may justly cause is, in the case of simple and well-arranged work, practically not to be considered. It is, however, a case suggesting something like the mathematical expression, "inversely as the square of the distance." If a certain amount of piping is in the least degree dangerous, twice that amount is four times as dangerous, and four times that amount is sixteen times as dangerous, and so on—not absolutely, of course, but relatively. In other words, while we make all of our drainage works as perfect as possible let us limit ourselves in all cases to the very smallest amount of piping, the least amount of ramification, and the smallest number of water-closets and other vessels consistent with reasonable convenience. A stationary wash-stand in a bath-room having a short and well-flushed connection directly with the main soil-pipe need never be objected to. A stationary basin ten, or twenty, or thirty feet distant, with a long connection-pipe should always be avoided. The luxury of an abundant flow of water in every bedroom seems at first blush to be worth all its cost. If we mean cost in money this is true; if we mean cost in risk it is by no means true. Practically, it is one of those luxuries in which no considerate person appreciating all the bearings of the case would think of indulging himself. One of the leading arguments of the trap-ventilation school is that such ventilation leads to the complete aeration of long lateral wastes. My remedy would be to abandon, as we always may in New York, the use of long lateral wastes. I should give an abundant supply of water at one convenient point on every floor. In larger houses where bath-rooms and water-closets may be required at considerable distances from each other I should give each its independent soil-pipe. Wherever a soil-pipe was constructed I should permit a good deal of license as to the conveniences in its immediate vicinity; but the moment the question arose of giving a wash-stand, or a sitz-bath, or a urinal to an

apartment, even ten feet away from the soil-pipe, I should exert all of my authority and influence in opposition to it; I should even oppose too generous a distribution of soil-pipes themselves, bearing always in mind the cardinal principle that the more we concentrate our discharge of wastes through single channels the better. One water-closet is better then two, if it will afford reasonable convenience. A bath-waste is kept in better condition the more frequently the contents of the tub are discharged through it; therefore, the fewer bath-tubs the better, and so throughout the whole range of plumbing appliances. Many "sanitary engineers," and more plumbers, will tell their clients that this is pure theory, and will advise, or consent to a wealth of conveniences all about the house. Plumbers are proverbially slow to learn, but they learn nevertheless, and they will in due time accept the pure theory as the wisest practice. Their clients will do well to anticipate them.

My own present idea is that if we can get rid of lateral waste-pipes longer than are needed for the connection of the most distant fixture in a bath-room there will be a sufficient change of the atmosphere of these pipes resulting from their open connection with a thoroughly ventilated soil-pipe. Assuming this to be so, then, the question of traps is the only important one that is not yet satisfactorily solved. As I have already indicated, I do not regard the system of "back ventilation," or the venting of water-seal traps as satisfactory. Although accepted and vigorously recommended by well-known authorities on house drainage it seems to me only a makeshift, and a makeshift that is attended with possible dangers at least equal to those which it is intended to remove. Mechanical traps are a makeshift also, though, on the whole, much less objectionable than the venting device. So far as I can judge from all that has yet been said and done, the best solution of the difficulty will be, if it can be made practicable, to allow the use of no trap of any kind, nor in any position which is not in full view whenever the fixture is used, excepting, perhaps, certain subsidiary traps on kitchen and laundry wastes. If we can trap our wash-basins in such a way that the top of the water-seal shall be always in view on looking into the bowl, and our bath-tubs in like manner, we will, I think, have secured the necessary safeguard, and we will have gained the further advantage, that persons of tidy disposition will see to it that a sufficient amount of fresh water is always passed through them to insure their constant cleanliness. In its present position the trap of a wash-bowl is out of sight, and generally out of mind. Unless frequently and copiously used it becomes the seat of a decomposition which makes it an offensive neighbor. The question of overflow-pipes for wash-bowls is still to be solved, and it cannot be denied that a wash-bowl overflow is almost universally a nasty thing. Bath-tubs may be, and in the best work they generally are, provided with standing overflows, which are quite free from objection; so far as I know they are the only ones that are free from serious objection. In the case of water-closets it seems to me now entirely feasible, and most important, to insist that there shall be no trap used in connection with it, except in the bowl itself, or in the outlet-pipe within plain sight from the bowl. There are now to be found a goodly number of closets of this character, beginning with the very simple and efficient plain hopper. I think that all of the "Gale" side-plug closets, of which the old "Jennings" is the type, should be rejected. If we retain closets of the old "Bramah" pattern, in which the water is held in the bowl by a valve at the outlet, we should make sure that this valve will be permanently efficient, so as to justify the entire abolition of the water-seal trap below. Invention has not yet gone very far in this direction, and we are only at the threshold of the success that is in time to be obtained, but we have gone far enough to demonstrate, in my judgment, the absolute wisdom of rejecting, not only the pan-closet, which all condemn, but the whole range of devices which depend for their separation from the soil-pipe on a trap of which the water is not in full sight.

Another point to be considered is the almost universal advisability of abandoning the use of slop-hoppers, constructing the water-closet in such a manner that it may serve the double purposes in the most perfect way, that is, by setting a clean earthenware closet-bowl on a tiled floor entirely open, at least to the front, with its cover so arranged as to facilitate ventilation as much as possible. The whole business of close carpentry about water-closets, used in connection with lead flashings, or the much better earthenware tray at the top, ought to be abandoned for good and all.

Again, all the devices for arresting and storing the grease of kitchen and pantry sinks, with a dependence on hand cleansing, that is, the old system of grease-traps, should also be discarded. In one way or another it should be provided that the waste of the sink shall all be retained in a mass until a considerable quantity has accumulated, and until its greasy content is chilled, allowing never a drip into the waste-pipe; only from time to time the discharge of a strong flushing volume sufficient to keep the channel perfectly clear, and to carry forward through the house-drain the burden of material which, when discharged in driblets, is sure to adhere to the walls of the pipe.

The soil-pipe ought never to be built into the wall, or in any manner covered from view. Especially should all openings in floors, through which pipes pass from one story to another, be hermetically closed against the possible passage of air. In much of the better house drainage that I have been called to examine, even very recently, the soil-pipe is hidden; no attempt is made to prevent the passage of air from floor to floor, there being an open channel beginning at the cellar, continuing through the soil-pipe casing and through the different floors, taking up its quota of the exhalations of putrid urine, and slops and leakage, almost inevitable with the tightly-cased closet, through to the top of the house. Ordinarily, the passage of the pipe through the roof is the only one that is carefully secured, and this only to prevent the entrance of rain-water. Under this arrangement the atmospheric impurities of one story are transmitted to the next, and as a perfect joint can, with difficulty, be made between a soil-pipe casing and a finished wall, there is ample opportunity for exhalation throughout the whole course, and especially about the casing of the water-closet, etc. This defect is a serious one in most of the best work now done, but it is one which can be and which should certainly be completely removed.

It is already pretty well understood, and the principle is very generally adopted, that the soil-pipe in its course from its vertical portion to the outlet-drain should always be in plain sight throughout its whole length, and should all be of the best and most durable material, jointed in the most careful manner. Under no circumstances should earthenware pipes be used within the walls of the house, nor for a certain distance beyond them, and never, except under the most imperative conditions, should any kind of drain be laid under the cellar floor. In this case as in all others every effort should be made to have the whole thing in plain open sight, where the least leak or defect may be detected at once. Very few houses are built with reference to their drainage works, and it cannot be expected that many will be so built. The drainage is for the house, not the house for the drainage. At the same time a few words of advice may be offered to architects, and especially to those owners — above all those house-building women—who are determined to combine the greatest convenience with the greatest safety.

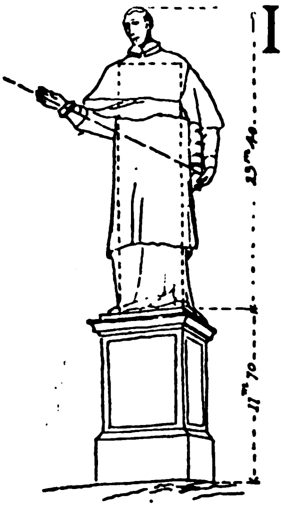
What is generally regarded as necessary to luxurious and entirely convenient living is, as I have indicated above, inconsistent with absolute security. It is well within the power of the plumber to distribute his fixtures and their supply and waste pipes in wild ramification throughout the whole building, and to make the whole *pretty nearly* safe; it is not, in my opinion, possible for him to make such widely distributed work *entirely* safe. My advice to all intending house builders would be to provide an abundant supply of hot and cold water, at least on two floors of even the most ordinary house, on every floor of houses of a more generous character, and perhaps at two or more points on each floor of very large houses. I would absolutely eject all water-closets, wash-bowls and baths from every bedroom, and from every closet opening into a bedroom, concentrating them all in one or more bath-rooms on each floor. The proper furnishing of clean water and removal of foul water in different rooms is a matter of little labor if the supply may be drawn, and if the waste may be discharged without going up and down stairs, while the cleanliness and absence of fetid organic decomposition is so much more easily compassed with the movable wash-bowl and pitcher, that this alone is a sufficient compensation for the slight additional service. The slop-hopper, almost always an abomination, located in a dark and unventilated closet, should find no place in any part of the house, nor should the ordinary urinal. A properly arranged water-closet will, as I have already said, serve both purposes in the most perfect and convenient manner.

The location of the bath-room is to be determined by several considerations. It must be conveniently placed, it must be protected by its position or by artificial warming against the inroads of frost, and it must, absolutely, be supplied with efficient ventilation, and with a ventilation that it is very difficult to secure unless it is placed against an outer wall of the house, and furnished with a direct opening to the outer air. A frequent position of the bath-room in New York houses, between the front and rear bedrooms, and opening into one or both of them, and into the hall, is probably the worst that could be devised. I do not, however, regard even such a position as absolutely inadmissible. If the drainage works are thoroughly well constructed, and if all of the indications that I have given concerning simplicity of arrangement, freedom of access, and absence of carpentry are followed, and especially if the principle of a copious flushing, and the entire abolition of dribbling are insisted on, perfect ventilation of the apartment will be a matter of comfort rather than of health.

GEORGE E. WARING, JR.

THE METALLIZATION OF WOOD. — *Les Mondes* describes the following process, invented by Mr. Rubennick, for metallizing wood: The wood is first immersed for three or four days, according to its permeability, in a caustic alkaline lye (calcareous soda) at a temperature of from seventy-five to ninety degrees. From thence it passes immediately into a bath of hydrosulphite of calcium, to which is added after twenty-four or thirty-six hours a concentrated solution of sulphur in caustic potash. The duration of this bath is about forty-eight hours, and its temperature is from thirty-five to fifty degrees. Finally the wood is immersed for thirty or fifty hours in a hot solution (thirty-five to fifty degrees) of acetate of lead. The process, as may be seen, is a long one, but the results are surprising. The wood thus prepared, after having undergone a proper drying at a moderate temperature, acquires under a burnisher of hard wood a polished surface, and assumes a very brilliant metallic lustre. This lustre is still further increased if the surface of the wood be first rubbed with a piece of lead, tin, or zinc, and be afterward polished with a glass or porcelain burnisher. The wood thus assumes the appearance of a true metallic mirror, and is very solid and resistant.

BARTHOLDI'S STATUE OF LIBERTY.[1] — I.



St. Charles Borroméo.

IN a few weeks will be finished the colossal statue of "Liberty enlightening the World," which, in the form of a lighthouse at the entry of the harbor of New York, is to symbolize the mutual goodwill of France and the United States.

This work is as remarkable as a matter of pure art as when regarded from the point of view of actual execution. From both points of view it does honor to our country. The sculptor who conceived the idea is M. Bartholdi, the valiant and sympathetic creator of the "Lion of Belfort." To M. Eiffel, the well-known engineer who constructed the Douro Bridge, and who is at the present moment engaged on the Garabit Viaduct, has fallen the difficult task of making the calculations for the iron skeleton of this gigantic figure. The shell of *repoussé* copper has been executed at Paris in the workshops of MM. Gaget, Gauthier & Co. The manner of beating out the copper has been unique; the difficulties have been overcome with ability; and the perfected work will make of the statue an immense *chef-d'œuvre* of the kind of those which, at a much smaller scale, were formerly used as the final test-piece of the artisan who was striving to acquire the title of master.

The public already knows the general facts relating to this work. That which is less known, and which is not less interesting are the practical conditions of the manufacture of this monument, which is 46 metres [148′ 6″] high; so let us describe it at some length as it is always possible to extract instruction from an industrial *tour de force* of this importance. The conception of monumental work seems to be characteristic of a certain degree of advancement in the civilization of nations. Without mentioning monuments properly so called — dolmens, menhirs, columns, and pyramids — we generally discover in the history of all great nations mention of some one colossal statue. Its conception often marks the apogee of local progress. The ancients erected many immense works in honor of their divinities. With them the omnipotence of a god often appeared to depend on the magnitude of his image, which, however, they always sought to endow with all possible force and majesty. The most imposing figures we recognize as their most powerful and most venerated gods.

In ancient Egypt the colossi formed an essential decoration of the grand temples and palaces. They were represented in an attitude calm and uniform, whether sitting or standing; the face full front, legs drawn together, the arms glued to the body, the hands extending along the thigh, or placed on the knees. All useless details were suppressed without disguise, in order to make the simplicity of the lines and the extent of surface stand out with more vigor. The style was sober, broad and severe; and if they represented individuals, it was always some man who had already shaken off his earthly character, and to a certain extent had entered the divine state. Besides its magnificent pyramids, its obelisks 100 feet in height, its gigantic tombs, its innumerable and enormous sphinxes, Egypt was covered with statues 50 and 60 feet high, cut from single blocks of stone.

Herodotus mentions the colossus of Osiris, which was 75 cubits [92 feet] high. At Memphis a few years ago, there was exhumed the statue of Rameses II, which was 49 feet (15 metres) high. Before the entrance of the palace of Luxor were seated four similar colossi 40 feet high. Near Gournah can still be seen the fragments of a gigantic seated statue of Rameses the Great, cut from a single red granite stone. It must have measured 17½ metres in height, and weighed more than a million kilogrammes [1,100 tons]. We will mention finally the two colossi of Memnon, which, although seated, measure more than 19 metres each [62 feet], and with their pedestal weigh more than 1,305,000 kilogrammes [1,436 tons]. Also the four seated statues 61 feet high (20 metres), which decorated the façade of the great temple of Isamboul.

The Egyptians employed stone almost exclusively, although they had acquaintance with the art of founding and working in bronze, of which several specimens have been discovered.

The Greeks, also, erected many statues to their divinities: they were most frequently of bronze, or covered with plates of gold and ivory. Their most celebrated sculptors adopted the colossal type, and did not disdain to join splendor of material, maintaining always the grandeur of their lines, to the artistic and ideal impression deriving from beauty of form and harmony of proportion.

The Minerva of Phidias was 39 feet (12 metres) high. In reality it was a wooden statue, supported on the inside by iron-work, and covered with beaten and sculptured sheets of gold, and plates of ivory finely carved. This was all put together with so much nicety of handling that it was impossible to discover the joints. When such a statue was erected in a very dry place, the humidity necessary for its preservation was maintained by sprinkling water about the pedestal. In the neighborhood of marshes, however, the injurious influence of the humid exhalations was counteracted by rubbing the statue with oil. The celebrated Jupiter Olympus by the same sculptor, was also of gold and ivory. The god was represented seated, and was 42 feet (13 metres) high.

Phidias made several other colossal Minervas, one of which, the "Athena Promachos," was entirely of bronze, and measured 50 to 60 feet (17 to 20 metres) in height. The famous colossus of Rhodes, the work of Chares of Lindos, was erected 300 years B. C., in honor of Apollo. We have only very vague information as to this statue, which must have been 40 to 43 metres high, though certain authors allow it only 30 metres; it was of bronze, and probably weighed 1,500 quintals, and cost 300 talents ($330,000). To assure its stability, it was filled with large stones. Nevertheless, it was overthrown about 50 years afterwards by an earthquake. It is difficult to admit that it was, as commonly stated, placed at the entrance of the harbor, with a foot on either side of the channel. The spread of its legs, calculated in harmony with its height, could not have been sufficient to allow the passage of vessels. Besides it would have been plunged into the water when overthrown; whereas, for several centuries it lay upon the ground and was destroyed, according to report, by the Arabs about the year 672 A.D.

Rome, especially under the Empire, erected many colossal bronze statues, most often representing Cæsars deified during their lifetime. That of Nero, by Zenodorus, was 110 feet high. Pliny particularly admired the manner in which all the little pieces which formed the skeleton of this statue were put together.

In Japan can be seen a bronze statue of the great Buddha, seated, which is 50 feet (16½ metres) high. In China and India the greater part of the gigantic idols are of masonry or of wood roughly carved. Wood, except in rare cases, as the wooden horse of Troy, has hardly ever been employed in colossal statuary, save in the interiors of temples. In the Middle Ages there were the St. Christophers which were erected at the entrance of many churches, and also the large statues of Roland.

In modern times, colossal statues have been executed only when the distance of the point of sight rendered an increase of dimensions necessary. Nevertheless, several celebrated artists have often felt the need of joining material grandeur to grandeur of expression; first among these is Michael Angelo. We will only mention his marble "David," more than 5 metres [16 feet] high; his bronze "Julius II," thrice life-size; and especially his "Moses," the *chef-d'œuvre* of modern sculpture. At the Pratoline Villa, near Florence, we admire the Apenninus, in the guise of a "Jupiter Pluvius," cut by Jean de Bologna. Nearly all the latest colossal statues have been cast in bronze. We will mention the equestrian statue of Peter the Great, by Falconet (1766). at St. Petersburg: the figure of the Czar, 3m. 66, and his horse 5m. 60 in height, the entire group weighing 18,000 kilogrammes. The "Bavaria," near Munich, erected in 1850. This statue is 15m. 80 [51 feet] in height, and weighs 1,560 quintals. The final plaster model was divided into fifteen portions for casting, for which process about six years were required. The "Virgin of Puy," the work of the sculptor Bonassieux, erected in 1860: its height is 16 metres [52 feet], and its weight about 100,000 kilogrammes [110 tons]. The plaster cast was divided into several fragments to facilitate the operation of casting at the foundry of M. Prenat at Gisors, cannon captured in the Crimean war furnishing the material. The different castings were adjusted and finished with the burin, then taken apart and transported to Puy, where the statue has been erected on the cliff Corneille, which rises 132 metres [430 feet] above the city. Finally the colossal statue of "Arminius" erected in 1875, on the summit of the Grotenburg, near Detmold, in Westphalia: its height is 20 metres [65 feet], not including the sword, which measures about 8 metres [26 feet]. It weighs about 237 quintals.

The most remarkable instance of the employment of *repoussé* work in colossal statuary is unquestionably the "St. Charles Borroméo," the work of the sculptor "Il Cerano," which was erected in 1697, near Arona on the banks of Lake Maggiore. In its construction this monument approaches nearly the work of Bartholdi, and consequently deserves special mention. Its height is 23m. 40 [76 feet], or, including its pedestal, 35m. 10 [114 feet]. The length of the arm is 9m. 10 [29′ 6″], that of the nose 0m. 85 [33 inches], and that of the forefinger 1m. 95 [6′ 4″]. The statue is formed of an envelope of copper *repoussé*, supported by means of clamps and bands of iron on an interior mass of masonry, which is almost tangent to the copper shell, and rises to the neck. The sheets of copper are only 1mm. 5 [.06 inch ?] in thickness. They were not hammered on the mould, but fashioned directly by hand. These plates are quite imperfectly joined by large rivets 40 millimeters apart, and the whole adjustment is coarse. They are directly connected with the masonry by means of iron clamps and ringbolts. In order to increase the rigidity of the shell, there have been used armatures of flat iron, 65mm. x 5mm., which cross each other vertically and horizontally about a metre apart, but are not connected with each other at the points where they cross. Here and there an occasional large copper rivet connects them with the envelope. The right arm, which is in an almost horizontal position, is supported by a large oak beam, 0m. 35 [13 inches] square, built into the masonry; this beam is strengthened like a ship's yard by flat irons, and is supported by tie-rods let into the stone. All the joints are keyed together in the roughest way. To-day the wood is completely rotten, and only the iron armature remains; it ought to be replaced by an iron beam. The left hand,

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[1] Translated from *Le Génie Civil.*

which holds a book, is supported by three rods of round iron suspended from a horizontal iron bar let into the masonry. Entrance to the statue is had through an opening concealed under a fold of the alb, which is reached by ladders. The ascent inside is sufficiently difficult; it is necessary to climb a kind of chimney-flue, and mount by the aid of the iron braces which connect the envelope with the masonry. It has often been wrongly stated that the head and hand were of cast bronze. The statue is entirely of hammered copper.

In the matter of other statues recently constructed of *repoussé* copper, we have merely to mention that erected at Alise-Sainte-Reine, in honor of Vercingetorix, the heroic defender of the Gauls. The height is 7 metres, and it was through the advice of Viollet-le-Duc that the sculptor Millet decided to execute it in copper. It was constructed in 1865, by MM. Monduit & Bechet, the predecessors of MM. Gaget, Gauthier & Co.

THE ILLUSTRATIONS.

STUDY FOR THE CLUB-HOUSE OF A LITERARY SOCIETY. MR. W. M. AIKEN, ARCHITECT, BROOKLINE, MASS.

THE design shows a building located on a steep hillside which gives opportunity for rooms of differing levels. The library, and over it, the stage with its dressing rooms (or committee rooms, as occasion may require) are on the lower side; the hall being on the upper side of the incline. The floor of the auditorium is on a level. A frieze of windows over the panelled wainscot, six feet from the floor and three feet high, lights the hall. The ceiling is sheathed between the rafters up to the level of the collar-beams. The flues are all collected into one stack by an arch over the proscenium opening, which opening may be enlarged or diminished by folding-doors; the tympanum of the arch is permanently filled with panelled work. Stone is used in random courses up to level of the cornice, also in topping out the chimney and throughout the tower, shingles being used in the triple overhanging gable. This sketch is from the study made in clay.

SKETCH FOR A SCHOOL-HOUSE, CUMBERLAND MILLS, ME. MESSRS. FASSETT & STEVENS, ARCHITECTS, PORTLAND, ME.

THE building is to be of brick laid in red mortar, and will cost less than $5,000. The two school-rooms will be finished in white-pine, natural finish.

THE CASTLE AT COCA, SEGOVIA, SPAIN.

[From a photograph.]

STORE OF R. H. WHITE & CO., BEDFORD ST., BOSTON, MASS. MESSRS. PEABODY & STEARNS, ARCHITECTS.

DESIGN FOR A COUNTRY HOUSE. MR. E. L. MESSENGER, ARCHITECT, NEW YORK, N. Y.

HOUSE OF H. L. SLOSSON, ESQ., GENEVA, N. Y. MR. J. G. CUTLER, ARCHITECT, ROCHESTER, N. Y.

HOUSE OF T. T. HAYDOCK, ESQ., WALNUT HILLS, O. MR. J. W. MCLAUGHLIN, ARCHITECT, CINCINNATI, O.

ARTISTIC EMBROIDERY.— WORK BY THE "ASSOCIATED ARTISTS."—I.

Benches
Ch. of S. Gilles
Bruges.
Belgium.

SOME embroideries recently produced by the "Associated Artists," under the direction of Mrs. T. M. Wheeler, seem to me to call for description in a paper devoted to art, and anxious to recognize the best that is produced in any department in our country. However it may be with other branches of decorative art, it is certain that in embroidery as in stained-glass we have no foreign rivals at this moment. Good work is done in many places, of course, and much improvement has been shown of late years; but on the Continent it runs chiefly to the imitation of old examples, and in England, though there is an earnest effort after greater originality, and though the South Kensington School has set an admirable example of skilful design and clever workmanship, yet its artists do not seem to have the true creative impulse which brings something novel and characteristic as well as good out of the intelligent study of the products of former times; and so great is the influence of South Kensington that no one in England seems willing to start out on an individual line and in a fresh direction. Here and there of course one may see fine specimens of handiwork which have been produced in accordance with personal likings, and not with school tradition. But these have usually been made for private purposes — under the eye of an artist not specially devoted to such work, or by the needle of some clever "amateur" embroiderer. Such examples are sporadic merely — cannot be held characteristic of the general movement of the day as may the products of a school like the "Associated Artists."

Mrs. Wheeler was one of the very first in this country to give serious attention to the art when decorative work of all kinds was coming into favor and fashion. It was largely owing to her knowledge, her energy, and her good taste that the New York Decorative Art Society's embroidery department was started on such a solid basis, and in such a good direction — that it did not become such a slavish adherent of South Kensington models as did certain other similar institutions in our country. From the beginning Mrs. Wheeler endeavored to form a school of design as well as of needle-work, and to secure originality as well as excellence; but it was only after she severed her connection with the Society and established her own place of business under the name of the "Associated Artists," that she was able fully to carry out her ideas. Much excellent work is done in other places in New York, but everywhere the credit is, I think, largely hers; some of those who execute it having been associated with her for a time, and all having been stimulated by her example; taught by her productions, and encouraged by her success. And no other work yet equals hers for variety, for originality, and especially for exquisite results in color. As such work usually goes at once to private houses without first coming before the public as do the majority of pictures, for example, it is known to a comparatively small circle, and so there seems a double reason why it should now and then be described in print. I am painfully conscious, however, of the difficulty of the attempt. Words can do so little to convey an idea of that which depends for its beauty not upon materials or processes which can be named, but upon felicities of form and color.

Mrs. Wheeler's establishment is a school in the true sense of the word, not a mere manufactory where the work is directed by an artist, perhaps, but executed more or less mechanically by subordinates. Mrs. Wheeler's aim is to instruct all who work under her in their various departments as fully as possible; to enable them not only to copy faithfully, and embroider beautifully, but to design for themselves and to educate themselves in artistic feeling, and in that sense of color which plays the major part in the success of their work.

What first strikes one, I think, in looking at her productions is their great variety and their independence of tradition, formula, or previous example. All the fine work of other days and of other countries has been carefully studied, and the principles which have their good results are thoroughly understood. Hints, of course, are taken from all quarters, from Oriental as well as from mediæval work, and the dainty examples of the last century; but in the majority of cases it is impossible to credit any of the work to definite outside inspiration. It is her own and not a copy — more original than current work in almost any other department we now succeed in. It is nature and not the art of another which is her chief teacher. When one examines her work this fact is seen to be of peculiar importance. To an intelligent study of natural forms and colors is owing both its originality and its constant variety. Of course natural forms have always been the basis of all good work in this branch, but except in certain Oriental products they are usually at the present day "conventionalized" to a far greater degree than Mrs. Wheeler finds necessary. To adapt as far as needful the natural motive to the exigencies of her design while preserving as nearly as possible both the forms and the hues of the models may be given as her formula. Whether she treats figures or floral motive the same is true. There is none of the stiff mathematical conventionalizing in either outline or hue which we have so long been told is the prime necessity, if "decorative" work is to be artistically successful. Her protest against this doctrine seems to me not the least important part of the work she has accomplished. When some fifteen or more years ago, a revival of interest in decorative work was started, the cardinal doctrines of the reformers was this of obligatory conventionalizing. No teacher was more potent than Mr. Eastlake, and none was a more uncompromising enforcer of this precept. At the time when he first spoke there was some virtue in his lesson. We had been accustomed to using natural forms in such grossly inartistic and inappropriate ways that a wider, truer doctrine could hardly have been preached with good effect. The hideous full-blown roses on our carpets; the absurd statues with which the stone-cutter decorated our mantel-pieces; the grotesque figures and flowers which covered our wall-papers, began to distress our eyes. But to turn at once from them to good organic design might well have been an impossibility. Had Mr. Eastlake preached his doctrine of conventionality merely as a temporary lesson; had he said that mathematical design was more easily learned, less ambitious, and therefore less likely to be unsuccessful than a truer, closer adherence to nature, he would have done the world better service. The first essays which followed his instructions were undoubtedly far preferable to those which had gone before. It was indeed a boon to see walls, and floors, and ceilings covered with delicately toned, inoffensive diaper patterns, or stiff and tedious, but not exactly ugly adaptations of nature's leaves and blossoms; but in saying that such work was the be-all and end-all of decorative art, in teaching that there must be an essential difference in aim between "art which produces a beautiful thing, and art which ornaments a useful thing," he did, it seems to me, an infinity of harm. The distinction was tersely put and had that apparent clearness and logic which always appeal to the mind of the young student. But the more we learn of art, the more we find that such cut-and-dried definitions are quite useless or positively harmful; the more we find that no artist worthy of the name in any age has ever worked by formulas so exclusive and so strict. That "decorative art" should never vie with

"representative art," should never look to the same results or work with the same ends in view, is a precept which sounds at first very rational, and is certainly very grateful to the ear of the would-be decorator who is excused by it from all the severer efforts of design. But if Mr. Eastlake had depended for the success of his teaching on anything but his own unsupported word and the natural avidity of his readers to adopt so easy a programme; if he had attempted to back up his precepts by any reference to the decorative work of former days, he would have found himself in difficulties. From the days of the Egyptians downwards, decorative art has always used natural motives in the frankest and freest way. And just as it has used them frankly and freely — with of course that necessary degree of adaptation which differs very widely in different branches — but not with the least desire for wilful "conventionalizing," it has been successful and valuable. It would be almost absurd to cite examples, had not the opposite pernicious lesson eaten so deeply into the conscience of most modern workmen, at least in English-speaking countries, where the books of Mr. Eastlake and his fellows have found their audience. Happily a reaction seems imminent, and it is, I repeat, Mrs. Wheeler's influence in its direction which seems to me the most important part of her activity. It seems strange that one should have to preach again a doctrine which has every great artist in the world for its exponent. The greatest mural decorators, for example, that we have known were the Florentines and the Venetians; the one with their frescoes in which, as with Michael Angelo, in Rome, and Signorelli, in Orvieto, the human form treated in the most purely "representative" way, forms the main subject of their brush; the others with their great canvases for wall and ceiling which have similar aims and motives, and equally great results. Of vase-painting, of porcelain and pottery of all sorts, of metal, and wood, and ivory, and of embroidery as well, the same facts are true. The nearer decorative work can come to strictly "representative" effects, the better is the result. Of course the necessities of form and material, and of use must never be forgotten; and the art must be so adapted that it will not travesty the one or interfere with the other. But the limits set by this necessity are far less narrow than some would have us think; so wide indeed, that organic design of one kind or another is almost always well in place. Furniture marks the extreme point of the preponderance of use over mere beauty; but even here we find the most artistic examples — as the stalls in old churches and the marble or bronze articles of the ancients — have always resulted from a frank incorporation of natural motives. It is not the necessities of "decorative art," but the weakness of decorators which has made it seem to certain writers and to certain practitioners that conventionalizing methods are the best to use. And it is only a wilful shutting of the eyes to history and to common sense that has enabled some to say that they are the *only* legitimate ones. It is easier, I repeat, to paint a wall or to embroider a curtain with arabesques, or with diapers, and not to make a hideous result, than it is to employ the human figure, or the forms of vegetable life in their purity and nobility. But it is a distinctly lower art which so proceeds; an art so low, indeed, that it cannot rank as more than an intelligent handicraft.

This is a rather long introduction with which to preface an account of a few of Mrs. Wheeler's recent embroideries; but I wished to explain her methods and her aims, as well as to describe their individual results. The latter will be but dimly perceived through my words, but the former should, I think, be laid to heart by all who aspire to work with her in her own branch, or in any other.

A few more words as to the methods actually followed in her school may not be uninteresting. Material for future use is constantly being accumulated by means of paintings in color made directly from nature. All sorts of natural forms are carefully studied by her artists, who strive in the first place merely to preserve the fleeting beauty of their models with as much exactitude as possible. When a new work is contemplated, the motive is selected from these studies, and color and form decided upon. Then the sketch is given to a designer who puts it in proper shape, adapting it as I have said to the particular requirement of the moment; but preserving with as much exactitude as possible both the outlines and the hues of nature. Then a drawing to scale is made for the use of the workwomen; while in its execution constant reference is made to the color sketches as a guide. Color being so largely a matter of pure instinct, however, Mrs. Wheeler sees fit to follow the last stage of the process with the utmost care. As the lines grow beneath the tool her constant supervision is required, at least so far as to hint and suggest what effects should be secured from day to day; but that such inevitably good results should be secured where so great an amount of work is under way presupposes that she is assisted by trained and sensitive eyes as well as by skilful fingers.

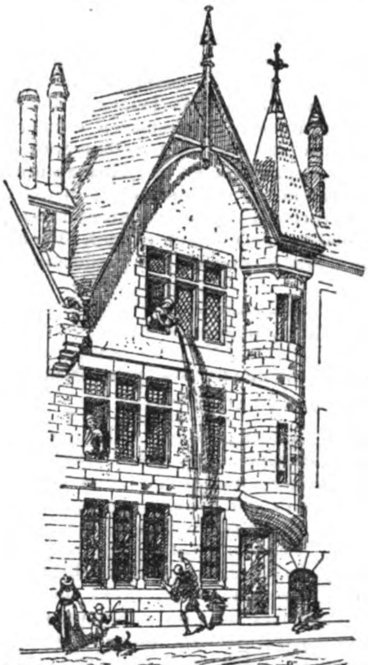
No small part of the beauty of her results is due to the excellence both in color and texture of her materials. Many of these are manufactured in this country from her own designs or ideas, and are marvels of artistic weaving. Sometimes the material is plain and only to be noted for its satisfactory tone as a mere background. Oftener it is woven in more than one tint which gives it a play of light and color skilfully seized upon and emphasized in the embroidery. Sometimes again the woven substance contains the rudiment of the desired design both in form and in hue, and needs only to be assisted and enhanced by the needle.

But my chapter is already so long that I must leave a description of individual results for another day.

M. G. van Rensselaer.

SANITARY PLUMBING.[1]—II.

The Efficiency of the Water-Seal.


Disposal of Household Wastes in the XIVth Century.

THE disposal of the organic wastes of our dwellings through water-carriage has been found, after long, careful and impartial trial in all parts of the world, to be, on the whole, the most satisfactory from both a sanitary and an economical point of view, where sufficient water is to be obtained. Even when these wastes are carried directly into the ocean, and their value as fertilizers apparently lost to mankind, this loss is more than compensated for by the rapidity, convenience and economy of the transportation.[2] But the fact of its superiority having been generally admitted, and the conditions accepted, practical methods have now been discovered of separating the valuable matter from the water by precipitation, partly by direct chemical agencies and partly through irrigation. As these methods are from year to year multiplied and improved, it is reasonable to suppose that eventually all the advantages of the water-carriage system may be enjoyed without incurring the loss of the valuable manurial components of the sewage, or the inconvenience occasioned by the pollution of our water-courses.

Coincident with the improvements in the methods of *disposal* of the sewage after it has once been carried beyond the walls of our houses, great progress has of late been made in the art of its safe and speedy *removal*, so that now it is possible in a well-plumbed house not only to insure the entire removal automatically of all wastes the instant they are produced, and long before decomposition has had time to set in, but also to prevent any return of sewer-gas through the channels of removal.

This perfect interception of sewer-gas is accomplished by the simple water-trap, acting in combination with a thorough system of sewer and soil-pipe ventilation. Without the assistance of ventilation the trap would be insufficient, and if this fact had been borne in mind many long discussions and doubts as to the efficiency of the water-trap would have been avoided.

It has been shown by Dr. Carmichael and others that if a water-seal be properly maintained against evaporation and siphonage, or destruction from any cause, the amount of sewer-gas that can pass through in twenty-four hours, even under the worst conditions, but with a ventilated soil-pipe, is infinitesimal and absolutely harmless, and that disease germs cannot pass at all through water at rest at normal temperatures. Dr. Carmichael also experimented with an unventilated soil-pipe, and found here that the quantity of carbonic-acid gas, the largest component of sewer-gas, given off from the trap in twenty-four hours was less than that obtained "when a bottle of lemonade was opened," and less than that which is exhaled by a man in five minutes.

As for the ammonia, sulphuretted hydrogen, and other gases or vapors which accompany the carbonic acid, their combined amount, even under the unfavorable conditions of a foul sewer and unventilated soil-pipe, was hardly equal to the one-thousandth part of that of the carbonic acid, and this amount diffused in twenty-four hours through the atmosphere of a house is evidently absolutely insignificant and harmless. With a ventilated soil-pipe the quantity which can pass through the water-seal was found to be about four times less, probably far less than what would come into our city houses through the doors and windows from the ventilation openings in the streets of the public sewers. Dr. Carmichael,[3] Pumpelly and Smyth, Naegeli,[4] Wernich,[5] Miquel,[6] and others have shown that disease germs and bacteria generally have the same "mechanical affinity"

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[1] Continued from page 111, No. 402.

[2] Of late the disposal of household wastes through subsoil irrigation has begun to be extensively practised in small towns and detached houses. The method has been found to work even in cold climates in winter, and has been ably described, perfected and carried into successful execution by Col. George E. Waring, Jr., Mr. Edward S. Philbrick (see Waring's "*Sanitary Drainage of Houses and Towns*," and Philbrick's "*American Sanitary Engineering*"), and others. A sufficient supply of water for flushing the water-closets and drains is easily obtained in country houses, where a public supply has not as yet been provided, by pumping by hand, wind or water mill into a large cistern at the top of the house.

[3] "*An Experimental Investigation into the Trap and Water-Closet System and the Relation of the Same to Sewage Products, Gaseous and Other*," by Neil Carmichael, M. D. C. M., in "*The Sanitary Journal*," of Glasgow, Scotland. Published by Alex. Macdougall, 66 Mitchell St., 1880.

[4] Naegeli: *Die niederen Pilze, U. S. W.*, München, 1877.

[5] Wernich: *Ueber verdorbene Luft in Krankenräumen, No.* 179, *Sammlung Klin. Vorträge*, Februar, 1880. Volkmann.

[6] Miquel: *Epuration des Eaux d'Egouts par le sol de Gennevilliers*, Journal D'Hygiène, etc., 188, 5e Vol.

for water which we observe in all solid particles, particularly of organic nature. They cannot rise spontaneously from the surface of water at rest, and at the normal temperature of our houses. It is only when the surface is violently agitated, or when gaseous bubbles rise to the top and burst that these particles are released and dissipated in the atmosphere. With a ventilated soil-pipe no such effervescence in the water of a trap can take place, and the agitation of its surface caused by properly arranged flushing does not throw the water out of the trap, nor allow of the escape of any germs of disease, for any water which may be washed up on the sides of the trap above the normal water-line is quickly carried down again by the upper flushing stream, and swept into the sewer.

Mr. Baldwin Latham says, in his work on "*Sanitary Engineering*," "One thing is certain, with reference to malaria, that all authorities are agreed that it is never extricated from a water surface," etc. The able paper of Dr. Carmichael, above referred to, a paper which should be read by all who care to have their anxiety on this score completely set at rest, describes the crucial tests made by him to prove the above statements regarding the action of disease germs in water. These experiments resemble absolute demonstrations, and may be accepted as final and conclusive.

Pumpelly and Smyth in their report to the United States National Board of Health, in 1881, on "The Relation of Soils to Health, and the Transmission of Germs from a Liquid to the Air," confirm the observations of Carmichael and others, and state the results of their careful experiments as follows: "At normal temperature no germs were given off from the decomposing liquids whenever their surfaces remained unbroken, even though in some of the experiments the air was continually conducted over them in a slow current. When the surfaces of the liquids were broken, however, by the bursting of bubbles, germs were invariably given off, and the sterilized infusions infected, no matter how slowly the aspiration was conducted."

Relating to the researches of Naegeli and others, this report says, "It has of late years been affirmed by many writers that germs are fully given off to the surrounding air through the evaporation of a liquid. The researches of Naegeli and the still more recent investigations of Carmichael, Wernich, Miquel and others, published during the present year in various scientific journals, have, however, conclusively proved the falsity of this view, their experiments clearly showing that, under normal conditions of temperature, at least, germs are never given off from a liquid at rest, or from a thoroughly moistened sand or solid matter of any kind."

Dr. Carmichael concludes the description of his experiments with the following: "Water-traps are, therefore, for the purpose for which they are employed, that is, for the exclusion from houses of injurious substances contained in the soil-pipe, perfectly trustworthy. They exclude the soil-pipe atmosphere to such an extent that what escapes through the water is so little in amount and so purified by infiltration as to be perfectly harmless, and they exclude entirely all germs and particles, including, without doubt, the specific germs or contagia of disease which we have already seen are, so far as known, distinctly particulate."

The source of danger in our plumbing is, therefore, not in the inefficiency of the *water* in the trap to keep out the enemy. A man walking by an ordinary sewer-vent in the street runs more danger of sewer-gas poisoning than one who sleeps with a sound water-trap, properly connected with a well-ventilated and well-made drain, at the very head of his bed.

The danger lies in the trap itself, its faulty form, material or connection, or in the want of means to prevent the loss of its water, or in the defects in the pipes or fixtures with which the trap is connected or surrounded. A defect no larger than a pin-hole on the sewer side of a trap, or in any waste-pipe may, in the limited atmosphere of a bedroom or dwelling-house, form the source of a serious and positive danger.

MR. RUSKIN ON ART IN TOWNS.

OLD FARM BUILDINGS CALVADOS. FRANCE

A PREFACE has been written by Mr. Ruskin to a pamphlet containing two papers read by Mr. T. J. Horsfall, of Manchester, on "The Study of Beauty," and "Art in Large Towns." Mr. Ruskin says: —

"I have been asked by Mr. Horsfall to write a few words of introduction to the following papers. The trust is a frank one, for our friendship has been long and intimate enough to assure their author that my feelings, and even practical convictions in many respects differ from his, and in some, relating especially to the subjects here treated of, are even opposed to his; so that my private letters (which, to speak truth, he never attends to a word of) are little more than a series of exhortations to him to sing—once for all — the beautiful Cavalier ditty of 'Farewell Manchester,' and pour the dew of his artistic benevolence on less recusant ground. Nevertheless, as assuredly he knows much more of his own town than I do, and as his mind is evidently made up to do the best he can for it, the only thing left for me to do is to help him all I can in the hard task he has set himself; or, if I can't help, at least to bear witness to the goodness of the seed he has set himself to sow among thorns. For indeed the principles on which he is working are altogether true and sound; and the definition and defence of them in this pamphlet are among the most important pieces of art-teaching which I have ever met with in recent English literature — in past art-literature there cannot, of course, be anything parallel to them, since the difficulties to be met and mischiefs to be dealt with are wholly of to-day. And in all the practical suggestions and recommendations given in the following pages I not only concur, but am myself much aided as I read them, in the giving form to my own plans for the museum at Sheffield; nor do I doubt that they will at once commend themselves to every intelligent and candid reader. But, to my own mind, the statements of principle on which these recommendations are based are far the more valuable part of the writings, for these are true and serviceable for all time, and in all places; while in simplicity and lucidity they are far beyond any usually to be found in essays on art, and the political significance of the laws thus defined is really, I believe, here for the first time rightly grasped and illustrated. Of these, however, the one whose root is deepest and range widest will be denied by many readers, and doubted by others, so that it may be well to say a word or two further in its interpretation and defence—the saying, namely, at page 22, that 'faith cannot dwell in hideous towns,' and that 'familiarity with beauty is a most powerful aid to belief.' This is curious saying, in front of the fact that the primary force of infidelity in the Renaissance times was its pursuit of carnal beauty, and that now-a-days (at least so far as my own experience reaches) more faith may be found in the back streets of most cities than in the fine ones. Nevertheless, the saying is wholly true; first, because carnal beauty is not true beauty; secondly, because rightly judged, the fine streets of most modern towns are more hideous than the back ones; lastly, and this is a point on which I must enlarge, because universally the first condition to the believing there is order in heaven is the sight of order upon earth; order, that is to say, not the result of physical law, but of some spiritual power prevailing over it, as — to take instances from my own old and favorite subject — the ordering of the clouds in a beautiful sunset, which correspond to a painter's invention of them; or the ordering of the colors on a bird's wing, or of the radiations of a crystal of hoar-frost or of sapphire, concerning any of which matters, men, so called of science, are necessarily and forever silent, because the distribution of colors in spectra, and the relation of planes in crystals are final and causeless facts, orders, that is to say, not laws. And more than this, the infidel temper which is incapable of perceiving this spiritual beauty, has an instant and constant tendency to delight in the reverse of it, so that practically its investigation is always, by preference, of forms of death or disease; and every state of disorder and dissolution — the affectionate analysis of vice in modern novels being a part of the same science. And to keep to my own special field of study—the order of clouds—there is a grotesquely notable example of the connection between infidelity and the sense of ugliness in a paper of the last *Contemporary Review*, in which an able writer, who signs "Vernon Lee," but whose personal view or purpose remains to the close of the essay inscrutable, has rendered with considerable acuteness and animation the course of a dialogue between one of the common modern men-about-town, who are the parasites of their own cigars, and two more or less weak and foolish friends of hesitatingly adverse instincts; the three of them, however, practically assuming their own wisdom to be the highest yet attained by the human race; and their only diversion on the mountainous heights of it being by the aspect of a so-called 'preposterous' sunset, described in the following terms: 'A brilliant light, which seemed to sink out of the landscape all its reds and yellows, and with them all life; bleaching the yellow corn-fields and brown heath; but brandishing into demoniac energy of color the pastures and oak woods, brilliant against the dark sky, as if filled with green fire. Along the roadside the poppies, which an ordinary sunset makes flame, were quite extinguished, like burnt-out embers; the yellow hearts of the daisies were quite lost, merged into their shining white petals, and, striking against the windows of the old black-and-white checkered farm (a ghastly skeleton in this light), it made them not flare — nay, not redden in the faintest degree — but reflect a brilliant speck of white light. Everything was unsubstantial, yet not as in a mist; nay, rather substantial, but flat, as if cut out of paper and pasted on, the black branches and green leaves, the livid, glaring houses, with roofs of dead, scarce perceptible red (as when an iron turning white-hot from red-hot in the stithy grows also dull and dim). "It looks like the eve of the coming of Antichrist, as described in mediæval hymns," remarked Vere, "the sun, before setting never more to rise, sucking all life out of the earth, leaving it but a mound of livid cinders, barren and crumbling, through which the buried nations will easily break their way when they arise."' As I have above said, I do not discern the purpose of the writer of this paper; but it would be impossible to illustrate more clearly this chronic insanity of infidel thought which makes all nature spectral; while, with exactly correspondent and reflective power, whatever is dreadful or disordered in external things reproduces itself in disease of the human mind affected by them."

COLORING THE FINISHING COAT.

To the Editors of the American Architect:—

Dear Sirs,— Can walls (inside) be successfully colored or tinted by mixing dry colors with the materials used in a finishing coat of hard finish?

Subscriber.

[Dry color mixed with the hard finish does not give a very good result, the evaporation of the water from the plaster causing a slight streaky efflorescence on the surface after drying. The best effect with colored plaster is obtained with one coat, or perhaps a scratch and brown coat, rubbed with a cork float to bring the sand to the surface. — Eds. American Architect.]

GLASS ROOFING TILES.

Youngstown, Ohio, August 24, 1883.

To the Editors of the American Architect:—

Dear Sirs,—In answer to the query of "Cluss & Schulze," in your issue of June 23, I would say the glass roof tiles which they mention are manufactured in Youngstown, Ohio, by Lane & Woodworth. The article is coming into quite general use for lighting and roofing work-rooms and various public buildings in the West. The St. Louis, Mo., Exposition Buildings are to be roofed with it. It is light, durable, not affected by the weather, and I do not see why it should not be a good thing.

G. D. Pellett.

[Messrs. Atterbury & Co., Pittsburgh, Pa., are also making glass shingles. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Charlemagne's Bridge over the Rhine.—Near the close of the eighth century, Charlemagne ordered the construction, over the Rhine, of a bridge resting on twenty-eight buttresses. The bridge was struck by lightning and burned to the level of the water. German engineers are now removing the remains of the old structure, on the Mayence side. They have already taken out fifty piles, with the lengths of five or six metres (5.468 to 6.562 yards). The wood, which is nearly eleven hundred years old, is so well preserved that it can still be used in building; the iron, which was riveted to the posts, can also be used, since it is covered only with a thin layer of rust. — *Chronique Industrielle.*

Pentelian and Parian Marbles. — Although Pentelian marble and all monuments made of it have at first a beautifully white and brilliant appearance, yet after a while, sometimes within a few months, sometimes not for years, they exhibit reddish-brown spots and stains, and marble columns of Pentelian marble gradually become covered with a reddish-brown film of oxide of iron. The color comes from sulphide of iron (pyrites) that frequently occurs in fine streaks in this marble and is oxidized in course of time by the action of air and water, and can then be recognized, very disagreeably, by their dark color. The spores of cryptogamous plants, such as fresh and salt water algæ, germinate in these red streaks. The new Academy at Athens was built of such Pentelian marble, and while hundreds of the blocks used still remain perfectly white and will probably remain so a long time, others already show yellow, brown, and even black spots. On the other hand, Parian marble, from which the old sculptors Praxiteles and Phidias chiseled their statues, has the property of remaining always white, because it contains no iron. Both kinds of marble have this excellent quality, namely, that they do not weather, lose their lustre, and look like the shells of boiled eggs, as is the case with Carrara marble. The name of marble, from its Greek derivation, signifies a stone that glistens on the broken or fractured surfaces. To impart to new marble the appearance of old, which is necessary in repairing injured antiquities, it may be painted over with a very dilute solution of chloride of iron, whereupon the new pieces acquire a fine yellowish-red color, similar to that produced by the influence of air and water for centuries upon the old marble. — *Austro-Hungarian Journal.*

American Society of Civil Engineers. — At a meeting of the Society held September 5, a paper by James L. Randolph, Member of the Society, and Ch. Engr. Baltimore & Ohio R. R., upon "Vibration, or the Effect of Passing Trains on Iron Bridges, Masonry, and other Structures" was read. Mr. Randolph refers to the fact that double-track bridges are moved in the direction of passing trains, and are consequently twisted and strains not provided for are produced; also that cattle-stops and open culverts, where built of rubble-work, have the walls shaken to pieces by vibration. The remedy he has supplied for these culverts and stops, has been to build them of large stone as nearly the same size as possible. The tall, thin bridge pieces and abutments on which iron bridges rest have their stones so much disarranged by vibration as to make it necessary to secure them with timber and iron straps. Iron bridges resting on stone pedestals vibrate in this manner, and receive a return blow from the vibration of the pedestal, particularly if the pedestal is a light structure, but as the iron and the stone do not vibrate in the same period, there must be times when the result is a movement in the direction of the force. The effect of this vibration has been particularly noticeable at the Harper's Ferry bridge, where there was a movement of four inches in four years. After the insertion of planks between the stone and iron, this movement ceased. Where the masonry of piers has a platform of timber between its foundation and solid rock, no displacement of stone has been noticed. Mr. Randolph contends that a monolith would be the best support for structures subject to vibration caused by strains, but that a monolith of the specific gravity of granite would give a damaging return blow. Timber would answer the purpose, but is perishable. The material which in his opinion is most serviceable is an artificial stone, which is about two-thirds the weight of granite, is compact, durable, and with very little elasticity. The paper was discussed by Messrs. Theodore Cooper, Chas. E. Emery, H. D. Blunden, and Wm. H. Paine.

The Excavations at Ephesus. — A statement has been prepared by Mr. Beresford-Hope, the chairman of the committee, respecting Mr. Wood's proceedings at Ephesus during the past year. In March of the present year, the sanction of the trustees of the British Museum having been obtained, Mr. Wood was authorized by the committee to proceed to Ephesus and resume the excavations which had been so long in abeyance for want of funds. The freehold of the site of the temple had been purchased by the trustees of the British Museum during the time of the former excavations. Their right to resume the work seemed accordingly to be clear, although the question of the privilege of removing the sculptures which might be found was more disputed. Mr. Wood, however, had not long resumed his work when the Mudir of the district visited the spot, and reported their recommencement to the Kaimachan of Scala Nova, who in his turn reported the same to the Governor of Smyrna, and in due time the Mudir received his written instructions to stop the excavations. In obedience then to the intimation of the Mudir, Mr. Wood suspended the work, which he had then carried on for eleven days, and took the first boat for Constantinople to obtain a fresh permit from the Ottoman Government. This interruption delayed operations for several weeks, but happily the required document was eventually obtained through the effectual good offices of Lord Granville and of the Embassy at Constantinople, and in three days from the time when the request was submitted to the Sultan the permit was handed to Mr. Wood by the Minister of Public Instruction. Mr. Wood then returned without delay and resumed the excavations. By this time the cool weather had passed away, and the hot season had set in, but as he was anxious to make some important discovery before abandoning the work till the autumn, Mr. Wood persevered until June 15, when he was forced to stop, for not only did the heat prevent the workmen from doing a fair day's work, but the water still stood in the excavations at a level which prevented the recovery of the stones which could be felt through the mud. Several interesting inscriptions and fragments of sculpture were, however, secured. The latter evidently belonged to the pediment at the east end of the temple. The most interesting of these was the leg of a male figure in high relief, somewhat larger than life. At a committee meeting held on July 24 it was decided to authorize Mr. Wood to return to Ephesus in September and resume the excavations. The committee was justified in this decision by the fact that a large area had been opened up to an average depth of 17 feet in the few weeks of work during the spring and early summer, while the stones which could only be felt at that time through the mud and water could be easily removed in the autumn after the water will have subsided for a depth of several feet. It is most desirable that the archæological public should subscribe liberally, if they desire the success of this most interesting exploration. If it is carried on as it ought to be to the extent proposed — namely, to the outer face of the colonnade which surrounded the temple — the result will probably be the unearthing both of beautiful sculptures and inscriptions possessing historical value. The discoveries which reach England will be placed in the gallery which is to be devoted at the British Museum to the Ephesian antiquities, and will be a great addition of permanent value to the national art treasury. — *The Architect.*

Ice Ingloos. — The natives of North Hudson Bay excel in a peculiar style of architecture, ice being the material with which they build their dwellings. Rectangular slabs, three to four by six or six and a half feet, are cut from some neighboring fresh-water lake where ice has formed to the depth of six inches. At a rough approximation these slabs may be said to be about the size of an ordinary door. The slabs are placed upright, resting on their ends and joined so as to form a circular pen of from ten to fifteen feet in diameter. Over the top of this the summer sealskin tent is spread for a roof, supported by tent poles crossing at convenient places and held in place by a lashing of sealskin about a foot below the top of the ice slabs. These ice ingloos are as transparent as glass, and before they are covered by the drifting snow, or their interiors are dimmed by the smoking of the sooty lamps, a night scene in one of these villages, especially if it be large, with brilliant burning stone lamps in full blaze, is one of the prettiest sights imaginable. These ice ingloos are, after all, only temporary dwellings, and as soon as the snow has collected in sufficient quantities for building purposes, huts are constructed of it, and the natives desert the ice houses as soon as the snow huts are completed. — *N. Y. Mail and Express.*

Glass for Flooring. — In many of the business houses in Paris, and especially in those of which the cellars are used as offices, glass is now being extensively employed instead of boards for flooring. At the headquarters of the Crédit Lyonnais, on the Boulevard des Italiens, the whole of the ground floor is paved with large squares of roughened glass embedded in a strong iron frame, and in the cellars beneath there is, even on dull days, sufficient light to enable the clerks to work without gas. The large central hall at the offices of the Comptoir d'Escompte has lately been provided with a similar flooring; and it is said that although its prime cost is considerably greater than that of boards, glass in the long run is far cheaper, owing to its almost unlimited durability. The material is cast in slabs about eighteen inches square by an inch and a half thick, and transmits a bluish light. — *St. James's Gazette.*

Shapira and his earliest "Find."—The first notable event in the career of Mr. Shapira, the inventor of the "Moabite" sheepskin decalogue, was his great discovery of Samson's coffin. "A few years ago," says the *Pall Mall Gazette,* "he made his appearance in London with this venerable relic of the period of the Judges, which he endeavored to persuade the authorities of the Palestine Exploration Fund to purchase. The genuineness of the article was vouched by the name of 'Sampson' legibly inscribed on the wood in archaic characters. Mr. Besant, we believe, consulted Dr. Neubauer as to the probable date of the inscription; and it was only when the Oxford savant pointed out that the Philistines had unaccountably misspelt the name of the Hebrew hero that Mr. Shapira and the coffin simultaneously disappeared."

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

284,162. Wrench. — Henry William Atwater, Orange, N. J.

284,170. Water-Tight Joint for Tiling, Vault-Covers, Areas, etc. — Emory Bosworth, Cleveland, Ohio.

284,180. Fire-Escape. — August Conrad Burghardt, Port Deposit, Md.

284,191. Mould for Casting Pipe of Plastic Material. — Daniel H. Dorsett, Chicago, Ill.

284,203. Vault Cover and Ventilator. — August W. Herr, Chicago, Ill.

284,222. Blind-Slat Operator. — Frederick Nelson, St. Paul, Minn.

284,253. Bolt. — Joseph N. Spencer and Thomas H. Dunn, South Manchester, Conn.

284,275–276. Bit-Stock. — John Chantrell, Bridgeport, Conn.

284,279. Ventilating-Fan. — Charles Cockson, Wigan, County of Lancaster, Eng.

284,281. Fire-Escape. — Edward Augustus Costigan, Boston, Mass.

284,282. Pile-Driver. — Roys J. Cram, Detroit, Mich.

284,299. Artificial Stone. — Peter F. Haverty, Shenandoah, Pa.

284,305. Friction-Clamp for Fire-Escapes. — J. Thomas Jones, Utica, N. Y.

284,308. Scaffold and Fire-Escape. — Joseph Klein, New York, N. Y.

284,311. Pneumatic Bell-Ringing Apparatus. — Robert Latowski, Oels, Prussia, Germany.

284,334. Device for Fastening Drawing-Paper to Drawing-Boards. — William Schonheyder, Shepherds Bush, London, Eng.

284,336. Door-Latch. — Alfred L. Scranton, Rochelle, Ill.

284,352. Elevator. — Emil Bachmann, New York, N. Y.

284,358. Door-Brake. — Warren S. Barlow, Paterson, N. J.

284,360. Fire-Escape. — Frederick E. Bauer, Danbury, Conn.

284,371. Roofing Compound. — Daniel Brobst, Portland, Mich.

284,381. Knob Attachment. — John K. Clark, Buffalo, N. Y.

284,396. Knob Attachment. — Thomas H. P. Dennis, Chelmsford, County of Essex, Eng.

284,402. Tank. — Moyer Fleisher, Philadelphia, Pa.

284,410. Window-Screen. — Seymour Glass and George H. Noble, Clintonville, Wis.

284,421. Glazing the Roofs of Horticultural Structures. — Thomas W. Helliwell, Brighouse, County of York, Eng.

284,424. Levelling-Instrument. — William C. Holmes, Atlanta, Ga.

284,431. Fire-Escape. — Chas. Johnson, St. George, New Brunswick, Can.

284,434. Fire-Escape. — Daniel A. Keech, Cannonsburg, Mich.

284,451. Fire-Escape. — Saml. MacCarty, Aurora, Ill.

284,506. Fastener for Meeting-Rails of Sashes. — Wm. E. Sparks, New Britain, Conn.

284,517. Fire-Escape. — Aaron Walker, Kokomo, Ind.

284,539. Weather-Strip. — Henry Carter, Gold Hill, Colo.

284,542. Fire-Escape. — Alexander M. Dye, Minneapolis, Minn.

284,544. Water-Closet. — Othniel B. Evans, Philadelphia, Pa.

284,559. Sky or Vault Light Roof and Roof-Pavement. — Thaddeus Hyatt, New York, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

Law School. — Chas. E. Cassell, architect, has prepared drawings for a two-st'y building, to be erected cor. Green and Lombard Sts., for the University of Maryland. It will be built of brick, with stone and terra-cotta finish, 34′ x 86′, and cost $5,000; Philip Walsh & Sons, builders.

Dwellings. — Frank E. Davis, architect, has prepared drawings for the following: —

Three-st'y brick building, 20′ x 71′, for Goldsborough S. Griffith, Huntington Ave., near St. Paul St.; cost, $6,000.

Three-st'y brick building, (double) 40′ square, for Caspar Vocke, Huntington Ave., near St. Paul St.; cost, $10,000.

Building Permits. — Since our last report thirty-seven permits have been granted, the more important of which are the following: —

C. L. May, three-st'y brick building, e s Durham St., bet. Lancaster and Aliceanna Sts.

D. C. Howell, three-st'y brick building, n e cor. Light St. and Quay Alley.

John Greb, three-st'y brick building, s w cor. Lancaster and Bethel Sts.

Franz Thoerne, two-st'y brick stable, in rear of Nos. 205 and 207, w s Durham St., bet. Eastern Ave. and Bank St.

E. W. Gorman, 11 two-st'y brick buildings, e s Patterson Park Ave. com. s e cor. Fairmount Ave.

Wm. McLaughlin, 2 two-st'y brick buildings, w s Norris Alley, n of Ramsay St.

Alex. M. Briscoe, 6 two-st'y brick buildings, e s Vincent Alley, bet. Pratt and McHenry Sts.

L. German, three-st'y brick building, e s Valley St., s of Biddle St.

C. H. Pierson & Co., one-st'y brick building, 50′ x 56′, and two-st'y brick office, e s Jackson St., bet. Clement St. and Fifth Lane.

Geo. C. Hershman, 4 two-st'y brick buildings, s s Moyer St., bet. Chester and Barkard Sts.

Francis T. King, 3 three-st'y brick buildings, e s Park Ave. bet. Richmond and Madison Sts.

Robert F. Morrison, 2 three-st'y brick buildings, n w cor. Baltimore and Exeter Sts., 6 three-st'y brick buildings, w s Exeter St., n of Baltimore St.

Edwin S. Long, three-st'y brick building, e s Valley St., s of Biddle St.

Medical University of Maryland, two-st'y brick building, n s Lombard St., bet. Paca and Green Sts.

Jos. Thuman & Son, 12 two-st'y brick buildings, e s Hanover St., bet. Fort Ave. and Randall Sts.

Conrad Schuchart, 3 two-st'y brick buildings, w s Stirling St., bet. Chase and Eager Sts.

Boston.

Church. — The drawings for the Church of the Messiah which is to be built on Huntington Ave., are being made by Mr. Henry M. Congdon of New York; estimated cost of building, $150,000.

Building Permits. — *Brick.* — *Commonwealth Ave., No.* 271, Ward 11, for Asa H. Caton, dwell., 25′ x 63′, four-st'y mansard; Asa H. Caton, builder.

Wood. — *Unnamed St.*, off Cemetery Lane, Ward 24, for Mrs. Caroline Jackson, 2 dwells., 20′ x 30′, one-st'y pitch; J. H. Burt & Co., builders.

Cushing Ave., near Jerome St., Ward 24, for Timothy M. Roach, 3 dwells., 22′ x 30′, two-st'y pitch; Wm. Blazo, builder.

Hancock St., near Jerome St., Ward 24, for Timothy M. Roach, 3 dwells., 22′ x 30′, two-st'y pitch; Wm. Blazo, builder.

Norfolk St., near Withington St., Ward 24, for Mrs. Caroline Jackson, 3 dwells., 22′ 8″ x 33′; J. H. Burt & Co., builders.

Tewpinct St., near Cottage St., Ward 24, for Frank O. Nash 4 dwells., 27′ x 35′; Wm. A. Blazo, builder.

Warner Ave., near Coolidge Ave., Ward 24, for A. A. Westcott, 2 dwells., 24′ and 30′ 6″ x 31′; ell, 16′ x 18′ 9″; J. H. Burt & Co., builders.

Parkman St., near Dorchester Ave., Ward 24, for Lewis Eddy, dwell., 36′ x 42′, two-st'y pitch.

Unnamed St., off Western Ave., near Waverly St., Ward 25, for John M. Hollis, 4 dwells., 20′ x 30′, one-st'y pitch.

Arcadia St., near Adams St., Ward 24, for Georgiana S. Drake, dwell., 23′ and 27′ x 36′, two-st'y pitch; A. C. Drake, builder.

Washington St., rear, near South St., Ward 23, for Charles Whittemore, carriage-house, 28′ x 35′, two-st'y pitch; A. N. Greenlaw, builder.

Boston St., cor. Dorset St., Ward 5, for L. E. H. Jones, dwell., 24′ x 35′ and 18′ x 20′, two-st'y pitch; C. E. Ricker, builder.

Prospect St., No. 34, for Geo. W. H. Smith, dwell., 23′ x 29′, two-st'y flat; Geo. W. H. Smith, builder.

Highland St., near Marcella St., Ward 21, for Robert A. Watson, dwell., 25′ x 39′, three-st'y flat; Samuel Rantin, builder.

Taber St., No. 4, Ward 20, for H. S. Lawrence, saloon and restaurant, 20′ x 38′, three-st'y flat; — Merritt, builder.

Church St., near Brook St., Ward 1, for John F. Slattery, dwell., 20′ x 30′, two-st'y pitch; John F. Slattery, builder.

I St., No. 108, rear, Ward 14, for Lyman Locke, dwell., 20′ x 30′, two-st'y flat; Lyman Locke, builder.

Millett St., near Park St., Ward 24, for J. P. B. Carlton, 2 dwells., 27′ x 28′, two-st'y pitch; J. W. Hildreth, builder.

Evans St., near Thetford St., Ward 24, for Samuel T. Long, dwell., 20′ and 33′ x 30′, two-st'y pitch; Samuel T. Long, builder.

Adams St., near Codman St., Ward 24, for Arthur H. Pierce, dwell., 28′ x 36′, two-st'y pitch; Arthur H. Pierce, builder.

Adams St., opp. Malvern St., Ward 24, for F. H. Pierce, dwell., 21′ 6″ and 28′ x 30′, two-st'y hip; F. A. Pierce, builder.

Brooklyn.

Building Permits. — *Degraw St.*, n s, 100′ e Hoyt St., 4 three-st'y brick dwells., tin roofs; cost, each, $3,500; owner, architect and builder, John A. O'Rourke, 78 Douglass St.

Quincy St., s s, 175′ e Patchen Ave., 3 two-st'y brick dwells., tin roof; cost, each, $3,200; owners and builders, Cardwell & Hawkins, 15 Lawton St.

Broadway, s e cor Park St., 2 three-st'y brick stores and tenements, tin roofs; cost, total, $14,000; owner, Herman Suttmeir, 172 Graham Ave.; architect, T. Engelhardt; builders, H. Grasman and G. Ross.

Chauncey St., s s, 250′ e Patchen Ave., two-st'y and basement frame dwell., tin roof; cost, $3,200; owner, J. Fritz, 456 Grand St.; builder, J. Pirruing.

Varick Ave., s e cor. Harrison Pl., two-st'y frame dwell., peaked roof of shingles; cost, $3,000; owner, Joseph Hurst, on premises; architect, T. Engelhardt; builders, A. Kunzweiler and P. Kunzweiler.

Central Ave., e s, 25′ s Troutman St., three-st'y frame double tenement, tin roof; cost, $4,300; owner, Julius Dewald, Central Ave., cor. Troutman St.; architect, G. Hillenbrand; builder, W. Bayer.

Boerum Pl., n s, 150′ w Graham Ave., three-st'y frame store and double tenement, tin roof; cost, $4,500; owner, G. Steinmetz, Montrose Ave., near Graham Ave.; architect, E. Schrumpf; builder, U. Maurer.

Union St., n s, 100′ e Hoyt St., three-st'y brick tenement, tin roof; cost, $6,000; owner, Jas. Belford, 431 Union St.; builder, J. Gallagher.

Eagle St., n s, 65′ e Manhattan Ave., four-st'y frame double tenement, tin roof; cost, $5,500; owner, Adam Shulze, Manhattan Ave., cor. Eagle St.; architect, S. Mullhaul; builder, J. Fallon.

Alteration. — *Third Ave.*, cor. Thirteenth St., raised one st'y; also three-st'y brick extension, gravel roofs, front and side walls of present building rebuilt; cost, $4,100; owners, Chas. A. Schieren & Co., 47 Ferry St., N. Y. City; architect, W. B. Tubby; builders, G. W. Buchanan and L. W. Seaman.

Chicago.

Bakery. — Adler & Sullivan are architects for the addition to F. A. Kennedy & Co.'s bakery on Desplains St., to cost $20,000.

Dry-House. — The dry-house for the J.M. Brunswick & Balke Co., was planned by Adler & Sullivan; cost, $65,000.

Factory. — The factory-building to be erected for the Wright & Lowther Oil & Lead Mfg. Co., to cost $40,000, was planned by Adler & Sullivan, architects.

Houses. — Adler & Sullivan are architects for C. P. Kimball's house and stable, now being erected on Ontario St., to cost $45,000.

The same architects planned the house on Michigan Ave., for C. H. Schwab, to cost $18,000.

The dwelling house to be built for Mrs. A. Halsted on Lincoln Ave., to cost $14,000, was also planned by Adler & Sullivan.

Also by same architects 3 houses for M. M. Rothschild, to be built cor. Thirty-second St. and Indiana Ave., to cost $17,000.

The same are architects for M. Selz's house at 1717 Michigan Ave., to cost $30,000.

Adler & Sullivan, architects, prepared the plans for the stores and flats at 881 West Lake St., for R. Knisely, to cost $16,000.

Adler & Sullivan are architects for R. Rubee's store and flats, at 309 South Clark St., to cost $16,000.

The same architects planned the store and flats for F. Kaufman, on Lincoln Ave., to cost $10,000.

School-House. — Adler & Sullivan, architects, made plans for the school-house at Marengo, Ill., to cost $20,000.

Building Permits. — Wm. Lesch, two-st'y dwell., 78 Jay St.; cost, $3,000.

Townsend & Godfrey, four-st'y theatre, 72′ x 136′, 167 Halsted St.; cost, $50,000; architect, Oscar Cobb.

John Rohles, two-st'y store and dwell., 2439 Wentworth Ave.; cost, $4,500; architect, J. Frank; builder, John Rohles.

P. Coulan, three-st'y dwell., 369 Wells St.; cost, $4,000.

M. Dewon, two-st'y dwell., 30 Nebraska St.; cost, $4,500.

Chas. Wilotz, two-st'y dwell., 2713 Hickory St.; cost, $2,500.

M. E. Icharlan, two-st'y dwell., near North Ave.; cost, $3,500; architect, H. Meissner; builder, J. Lanstin.

H. Buschmeier, three-st'y factory, Huron St.; cost, $5,000; architects, Furst & Rudolph; builder, Geo. Schaffer.

J. E. Rogerson, two-st'y dwell., 193 Seminary St.; cost, $2,600.

F. Doorak, 2 three-st'y stores and dwells., 670–672 Throop St.; cost, $15,000; architect, P. W. Ruehl, builders, Benes & Sayer.

V. Kubin, three-st'y store and dwell., 777 Allport Ave.; cost, $7,500; architect, John Bessler; builders, Benes & Sayer.

Geo. Schert, three-st'y dwell., 519 Sedgwick St.; cost, $4,200.

J. Schnable, two-st'y dwell., 656 Superior St.; cost, $2,800.

Henry Sweet, two-st'y dwell., 1465 Milwaukee Ave.; cost, $2,000; builder, Geo. Peterson.

Saml. Simons, 4 two-st'y dwells., Elizabeth St.; cost, $8,000; architect, Ackermann.

American Express Co., freight-house, Bunker St.; cost, $5,000; architects, Treat & Folz; builder, E. Ernshaw.

A. A. Harris, two-st'y dwell., 449 West Congress St.; cost, $3,500.

John Smith, 3 two-st'y dwells., Thirty-third St. and Vernon Ave.; cost, $15,000.

Turner & Bond, 2 cottages, 3040 and 3045 Butler St.; cost, $2,500.

S. M. Slack, two-st'y flats, 3324 Dearborn St.; cost, $3,000.

Jas. McKeen, two-st'y flats, 3828 Dearborn St.; cost, $3,000; builder, B. Hawley.

Cincinnati.

Houses. — Albert Schwill, Esq., is to build a two-st'y frame dwell. on Mt. Tusculum; from plans prepared by Mr. Geo. W. Rapp, architect; cost, $10,000.

Mr. Geo. W. Rapp, architect, has prepared plans for two-st'y frame dwell., to be built for Mr. Chas. Wittstein on Kemper Lane; cost, $7,000; also for altering brick dwell. of Dr. Schneider, cor. Ninth and Vine Sts.; cost, $10,000.

Mrs. E. A. Horton will build two-st'y dwelling-house on Ashland St., costing $5,500; Chas. Crapsey, architect.

Detroit.

Building Permits. — John McDuff, 4 brick stores, Nos. 668 to 674 Michigan Ave.; cost, $12,000.

M. W. Scovill, 2 frame dwells., Nos. 149 and 151 Russell St.; cost, $6,500.

G. A. Dupuis, brick church, Medbury Ave.; cost, $9,000.

Julius Hess, brick house, No. 65 East High St.; cost, $6,300.

Julius Hess, brick barn, Plumb St.; cost, $6,500.

A. Backus & Sons, brick warehouse, West Fort St.; cost, $4,000.

J. F. Weber, 6 frame dwells., German St., cor. St. Aubine Ave.; cost, $5,400.

F. B. Wittman, brick store, No. 525 Catharine St.; cost, $3,000.

W. E. Armstrong, 3 brick stores, West Woodbridge St.; cost, $4,500.

John Burt, brick barn, Woodward Ave.; cost, $3,000.

Wm. B. Wesson, addition to laboratory, Twenty-first St.; cost, $19,000.

John Da More, frame dwell., No. 205 Twenty-fourth St.; cost, $3,600.

W. F. Londers, brick church, Catharine St.; cost, $5,000.

E. A. Waterfall, brick dwell., No. 628 Cass Ave.; cost, $5,000.

Building dull at present.

New York.

Fall Probabilities. — Little work of importance is talked of for immediate erection, and the outlook now looks slim for new fall work.

Church. — Work on the new church of St. Cecilia, One Hundred and Sixth St., bet. Lexington and Fourth Aves. is rapidly progressing. Ground was broken last April, and the foundation of a substantial structure has been erected. The corner-stone was laid September 9.

Dwellings. — Thirteen brownstone houses, four-st'y high, varying in size from 16′ x 45′ to 18′ x 50′, on Fourth Ave. and Ninety-first St., at a probable cost of $250,000, are to be built by Mr. Andrew J. Kerwin;

Building Permits. — *Fifty-eighth St.*, s s, 200′ w Ninth Ave., 5 four-st'y brownstone front dwells., tin roofs; cost, $20,000; owner, J. S. Howard, 121 Broadway; architect, Jos. M. Dunn; builder, J. S. Howard.

Thirty-seventh St., s s, 100′ e Tenth Ave., five-st'y brick tenement, tin roof; cost, $16,000; owner, Patrick McCoy, 531 West Thirty-fifth St.; architect, John Sexton; builder, John Smith.

Canal St., No. 6[illegible], —— five-st'y brick tenement and store, tin roof; cost, $11,000; owner, Simon Liebowitz, 75 Hester St.; architect, Wm. Graul.

Crosby St., n e cor. Jersey St., seven-st'y brick store and factory, tin roof; cost, $110,000; owner, Leo Schlesinger, cor. Eleventh St. and Avenue D.; architects, H. J. Schwarzmann & Co.; builders, List & Lennon.

Second Ave., w s, 150′ 7″ w One Hundred and Twenty-third St., five-st'y brick tenement and store, tin roof; cost, $17,000; owner, John F. Dunker, s w cor. Tenth Ave. and One Hundred and Twenty-fifth St.; architect, James Barrett.

First Ave., s e cor. Eighty-eighth St., four-st'y brick tenement and stores, tin roofs; cost, $15,000; owner, Jacob Wicks, Jr., 508 e Eighty-seventh St., architect, John Brandt.

One Hundred and Forty-sixth St., s s, 175′ e Tenth Ave., three-st'y brick dwelling, gravel or tin roof; cost, $6,000; owner, Sam'l F. Warner, 16 e Fortieth St.

Tenth Ave., s w cor. One Hundred and Seventieth St., two st'y brick dwell., slate and tin roof; cost, $24,000; owner, M. L. Stieglitz, 212 e Seventy-ninth St.; architect, H. Kreitler; builders, C. R. Terwilliger and Geo. Santer.

St. Ann's Ave., e s One Hundred and Twenty-fifth St., Westchester Ave., three-st'y frame dwell., tin roof; cost, $3,500; owner, Mrs. Ann Callahan, on premises; architect, W. W. Cardiner.

Third Ave., No. 1582, five-st'y brick tenement and store, tin roof; cost, $29,000; owner, Estate Wm. R. Renwick, Thos. Patton, exr. 113 e Fifty-seventh St.; architect, Geo. M. Huss; builders, Cornelius Callahan and Grisler & Fausel.

One Hundred and Thirtieth St., s s and n s One Hundred and Twenty-ninth St., 270′ e of Seventh Ave., 6 three-st'y brownstone front dwells., tin roofs; cost, $14,000; owner, Samuel O. Wright, 255 w One Hundred and Twenty-seventh St., architects, Cleverdon & Putzel.

Elizabeth St., No. 153, five-st'y brick tenement and store, tin roof; cost, $12,000; owners, Eliza D. Ogilby and Mary D. Hoyt, Roseville, Newark, N. J.; architects, Cleverdon & Putzel; builder, D M. Kennedy.

St. Mark's Pl., No. 10[illegible], five-st'y brick flat, tin roof; cost, $18,000; owner and architect, Jobst Hoffman, 153 Fourth Ave.

One Hundred and Seventy-eighth St., n s, 125′ e Grant Ave., 2 two-st'y frame dwells., tin roofs; cost, $3,000 each; owner and architect, Anthony Royce, 2026 R. R. Ave.; builder, Wm. Coogan.

One Hundred and Seventy-second St., n w cor. Madison Ave., 2 two-st'y frame dwells.; tin roofs; cost, $2,000; owner, Wm. Finger, Third Ave., bet. One Hundred and Seventy-third and One Hundred and Seventy-fourth Sts; architect, John E. Kerby; builder, John Kerby.

Orchard St., s s, 225′ e Fleetwood Ave., 2 two-st'y frame dwells., shingle roof; cost, $3,000; owner, Mary Ann Lodge, 278 Alexander Ave.; architect, John E. Kerby.

Alterations. — *West Forty-sixth St., No.* 204, raise roof 4′; also a four-st'y brick extension, tin roof; cost, $7,000; owner, Kate L. Westerfield, 411 w Fifty-seventh St.; architect, John J. Brierly; builder, David Christie.

West Fortieth St., Nos. 346 *and* 348, two-st'y brick extension, tin roof; cost, $4,500; owners, Fred. F. Keller, 123 w Forty-seventh St., and Wm. G. Arms, 547 w Forty-sixth St.; architect, C. F. Ridder, Jr.; builder, not selected.

West Twenty-fourth st., No. 7, fitting up Russian bath-rooms in basement and first-st'y, and thorough repairs; cost, $12,000; owner, Edward T. Stokes, Hoffman House; architect, Paul F. Schoen.

Philadelphia.

Alteration.—On School Lane (Germantown), addition to residence of E. T. Steel, Esq., of library and conservatory, from plans by Addison Hutton, architect.

Boiler-House.— At Front and Lehigh Aves., boiler-house for the Episcopal Hospital, from plans by Wilson Bros. & Co., architects.

Houses.—On Thirty-fourth St., near Race St., a pair of semi-detached houses, 22′ x 80′ each, of Leiper stone, for Mrs. A. L. Baker, from plans by Addison Hutton, architect.

Building Permits. — *Eleventh St.*, s Fisher Lane, two-st'y dwell., 14′ x 28′; J. McCartney, contractor.

Sunset Lane, w Chestnut Hill and Spring House Pike, two-st'y stable, 41′ x 50′; Jas. McCartney, contractor.

Passyunk Ave., s w Federal St., one-st'y foundry, 69′ x 96′; Jas. Lanning, contractor.

Front St., n Greenwich St., 4 two st'y dwells., 14′ x 28′; Chas. H. Clark, owner.

Morris St., s s, w Twelfth St., 3 two-st'y dwells., 16′ x 42′; W. J. Smith, contractor.

Tenth St., e s, n McKean St., 2 two-st'y dwells., 15′ 6″ x 38′; Arthur Miller, owner.

Dudley St., e Tenth St., two-st'y dwell., 14′ 2″ x 38′; Arthur Miller, owner.

Ontario St., n s, e Kensington Ave., two-st'y dwell., 14′ x 38′; J. Dowling, owner.

Sartain St., w s, bet. Huntingdon and Oakdale Sts., 50 two-st'y dwells., 14′ x 28′; Thornton & Norton.

Wilder St., No. 1931, two-st'y dwell., 14′ x 35′; J. H. Young.

Lawrence St., n e cor. Cumberland St., three-st'y dwell., 18′ x 60′; Robert Buchanan.

Eighth St., n Lehigh Ave., three-st'y dwell., 16′ x 50′; W. Bartholomew.

Ripka St., cor. Chestnut St., three-st'y dwell., 18′ x 40′; W. Goodfellow.

Kensington Ave., s e cor. Wellington St., two-st'y dwell., 19′ x 50′; J. M. Buchanan.

Belgrade St., e s, s Allegheny Ave., 6 two-st'y dwells., 16′ x 46′; Christian Schwaneberg, owner.

Hancock St., s Susquehanna Ave., two-st'y dwell., 18′ x 58′; Geo. Kersler.

Fifth St., e s, n Lehigh Ave., 2 two-st'y dwells., 18′ x 5[illegible]′; Daniel Neveling, Jr.

Broad St., cor. Wharton St., three-st'y dwell., 20′ x 78′; A. H. Williams, contractor.

Tenth St., No. 738, three-st'y dwell., 15′ x 45′; A. Williams, contractor.

West of Frankford Road, n Master St,, three-st'y store; Shegog & Quigley.

Front St., cor. Washington Ave., 3 three-st'y dwells., 14′ x 29′; S. Elliot.

Fairhill St., w s, n Dauphin St., two-st'y dwell., 15′ x 40′; H. Schneider, owner.

Uber St., w s, s Norris St., 2 two-st'y dwells., 13′ x 42′; G. H. Fritz.

Poplar St., e Canal St., addition to packing-house, 40′ x 150′; P. H. Somerset, contractor.

Dickinson St., No. 3121, three-st'y store and addition, 16′ x 32′; Mary Megary, owner.

Twelfth Ave., cor. Susquehanna Ave., addition to City Passenger Railway stable, 27′ x 80′; Cyrus Lewis, contractor.

Atmore St., No. 1233, three-st'y dwell., 16′ x 38′; H. S. Franks, contractor.

Filbert St., No. 1618, four-st'y factory, 18′ x 60′; W. Massey, contractor.

Twenty-ninth St., n Brown St., three-st'y factory, 80′ x 118′; J. B. Doyle, contractor.

Twenty-ninth St., cor. Wright St., 14 two-st'y dwells., one with store, one 17′ x 32′, thirteen 14′ x 32′; J. W. Sharp, owner.

Twenty-fourth St., cor. Jefferson St., 13 two-st'y dwells., 19′ x 45′; J. W. Sharpe, owner.

Fisher Lane (Tenth St. and Lindley Ave.), two-st'y dwell., 34′ x 50′, W. G. Smith, owner.

Sunnyside Ave., w Thirty-fifth St., 16 three-st'y dwells., 15′ 8″ x 44′; Geo. E. Abbott, owner.

Cottage Ave., bet. Nineteenth and Twentieth Sts., 2 three-st'y dwells., 18′ x 24′; Jno. McGill, owner.

West Chelton Ave., No. 66, two-st'y club-house, 30′ 6″ x 76′; T. W. Wright, contractor.

Graver's St., s s, n Township Line, two-st'y dwell., 50′ x 70′; Geo. Hearst.

Federal St., No. 1320, two-st'y stable, 16′ x 44′; Andrew White.

St. Louis.

Building Permits. — Sixty-seven permits have been issued since our last report, twenty-one of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

George A. Owens, two-st'y brick dwell.; cost, $3,000; Patrick Mulcahey, builder.

Morris, Butts & Co., three-st'y brick pork-house; cost, $4,000; Henry E. Roach, builder.

Weindel & Wirthlin Mf'g Co., two-st'y brick keg and barrel factory; cost, $10,000; L. Kledus, architect; sub-let.

J. G. Bremer, two-st'y brick dwell.; cost, $5,900; W. C. Slicer, architect; J. C. Flynn, builder.

L. H. Rumsey, two-st'y brick dwell.; cost, $4,000; S. F. Simmons, architect; L. H. Rumsey, builder.

Joseph Wiget, two-st'y brick dwell.; cost, $7,000; George Boettinger, builder.

Charles F. Lutz, two-st'y brick dwell.; cost, $2,500; Ellerbach, builder.

Anchor Milling Co., four-st'y brick warehouse; cost, $8,000; Jungenfeld, architect; sub-let.

J. J. Brodericks, 2 two-st'y brick dwells.; cost, $11,000; J. J. Furlong, architect; R. Shinick, builder.

G. W. Kaup, two-st'y brick dwell., cost, $5,000; A. Beinke, architect; Grunewald & Wind, builder.

A. Gehner, two-st'y brick bank building; cost, $10,000; W. C. Slicer, architect; sub-let.

Mrs. Pabst, two-st'y brick dwell.; cost, $4,963; J. Flanery, architect; P. F. Meagher, builder.

German Baptist Congregation, one-st'y brick church; cost, $2,600; sub-let.

General Notes.

Almont, Mich.—The Union School District No. 1 of Almont, has contracted with Wm. H. Myers, of Hillsdale, Mich., for the construction of a school-house; from plans by N. J. Gibbs, Mt. Clemens, Mich., for $15,000.

Almont will also have a new town-hall and engine-house; cost, $5,000; to be built by Wm. H. Myers, of Hillsdale, Mich.; plans by N. J. Gibbs, Mt. Clemens, Mich.

Aurora, Ill. — Adler & Sullivan, architects, of Chicago, have made plans for the factory-building for the Aurora Watch Co., to cost $35,000.

Austin, Minn. — The large three-st'y block of Shaw & Hall, on the cor. of Main and Mill Sts., is to be rebuilt at once, the third-st'y taken off, new foundation put in, etc.

Clifton, O. — Mr. A. C. Nash, of Cincinnati, has prepared plans for a stone church for the Presbyterian Society; cost, $20,000.

Conshohocken, Pa. — William Stemple, Sr., will build 3 stores and a dwelling-house adjoining the row of stores just completed.

Denver, Col. — Brick car stable on Blake St,, for Denver City R.R. Co.; cost, $50,000.

Dover, N. H. — Dover is to have a new court-house.

Fire Island, N. Y. — Another year will probably see a large hotel erected on Havemeyer's Point, opposite Fire Island, in charge of Mr. J. P. Colt, of the Argyle, at Babylon, L. I.

Mt. Clemens, Mich. — Kracht & Co., are building a brick store; cost, $3,200.

J. E. Nellis & Son, Joseph Lonsby, and Dr. Lennant each a $2,500 frame cottage; from plans by N. J. Gibbs.

Wm. Fluemer, proprietor of the "City Flouring Mill" is erecting a brick elevator; cost, $12,000.

Newark, N. J. — The erection of a new synagogue has been begun in Bedford St., for the congregation Benai Israel.

North Adams, Mass. — The plans for the new hospital have been approved by Drs. Polk and Loomis, of New York, and $15,000 have been raised by the town for the building.

Richmond, R. I. — At a recent town meeting held on Tuesday last, at the town-house in Richmond, it was decided to erect a new town-house. The committee appointed to superintend the erection of the new building is Messrs. Clark Barber, Ellison Tinkham, and Chas. J. Greene.

Rochdale, Mass. — Messrs. Reuben & E. I. Comins are building a new brick picker-house, 30′ x 52′, one-st'y; also new storehouse, 30′ x 50′.

Savannah, Ga. — The present year has been very active in the building line in this city, and all interested in building and the building trades have been quite busy. The following work is about to be commenced by J. J. Nevitt, architect: —

A residence for J. Rauus, Esq., St. Catherine Island, to cost $10,000.

Colored Odd Fellows hall; cost, $8,000.

The other architects also have had their share of work, and houses are in demand, and rents advancing.

Sioux City, Io. — Normal school-house on Madison St.; cost, $7,000.

Spencer, Mass. — The corner-stone of the Catholic church was laid August 5.

Wheeling, W. Va. — Brick factory for J. R. Bodley, on Eighteenth St.; cost, $8,000.

LATEST.

Brooklyn.

Building Permits.—*Lafayette Ave.*, s s, 20′ w Grand Ave., 2 three-st'y brick dwells., tin roofs; cost, each $4,300; owner, Henry Blatchford, Montague St., near Court St.; architect, R. Dixon.

Gates Ave., No. 9[illegible]5, n s, about 150′ w Ralph Ave., two-st'y brick store and dwell., felt and gravel roof; cost, $2,700; owner, Chas. L. Applegate, Tenth St., New York City; architect and builder, J. N. Smith.

Seventh Ave., n w cor. Nineteenth St., 4 three-st'y frame double tenements, tin or gravel roofs; cost, each $3,000; owner and architect, J. H. or I. H. Herbert, 116 Gates Ave.; builder, not selected.

Park St., No. 13, n s, 25′ e Broad St., three-st'y frame double tenement, tin roof; cost, $4,500; owner, Ernst Hoffmann, Flushing Ave., cor. Yates Place; architect, T. Engelhardt; builders, — Kuhn and J. Rueger.

Twenty-sixth St., s s, 250′ w Fourth Ave., two-st'y frame dwell., felt and gravel roof; cost, $2,000; owner, Wm. Grun, Twenty-sixth St., bet. Third and Fourth Aves.; builder, not selected.

Hancock St., s s, 200′ w Nostrand Ave., 3 three-st'y brownstone front dwells., tin roofs; cost, each $8,500; owner and builder, S. E. C. Russell; architect, J. D. Reynolds.

Twenty-seventh St., s s, 300′ w Fourth Ave., 2 three-st'y brick tenements, felt and gravel roofs; cost, each $4,500; owner and architect, Jno. Kinney, 202 Twenty-first St.; builders, C. Long and P. Kelley.

Bids and Contracts.

Boston, Mass.— Joiners' work and wood flooring for post-office, etc., at Boston, Mass.: —

McNeil Bros., joiners' work, $18,894; wood flooring, $5,898 (*accepted*).

George A. Mills, joiners' work, $19,989.23.

E. B. Witherspoon, joiners' work, $21,000; wood flooring, $8,145.

Joseph Thomas & Son, joiners' work, $26,978; wood flooring, $7,540.

Jackson & Sharpe Company, joiners' work, $29,463.20; wood flooring, $5,728.60.

The bids of McNeil Bros., for joiners' work ($18,894), and Jackson & Sharpe Company, for wood flooring, ($5,728.60), the lowest, have been accepted.

Henderson, Ky. — Holtzclaw Bros., of Washington, D. C., were awarded the contract for building the Henderson Cotton Mills, advertised in this paper some three weeks ago, for $75,000.

Jackson, Miss.— Synopsis of bids for labor and materials for court-house and post-office: —

Rees Evans, $26,450, as per specification, five months; $32,280, Berea stone and terra-cotta; $42,514, all stone Berea.

M. A. McGowan, $35,950, as per specification ten months; $45,950, all stone, Fossick, Ala.

Kenderine & Paret, $38,319, nine months.

Belknap & Dumesnil Stone Company, $39,000, as per specification, ten months; $49,225, all stone.

Bowling Green, nine months, $46,825, plain modillion course.

J. N. Marshall, $40,834, as per specification, Fossick, twelve months.

D. J. Macarty, $42,690, as per specification, Oman & Stewart stone, eight months; $54,000, stone, Oman

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CONTENTS.

THE report of the committee which investigated the charges made against the Supervising Architect of the Treasury Department is, or at least ought to be, an interesting document to those architects who are charged with the responsibility of expending public money. Among the comments of the daily papers upon it, while we find a good deal of foolishness, and some malicious misrepresentation, there is also much that goes to show that the committee, although from the architect's point of view rather unreasonable in some respects, well expresses the idea which sensible citizens generally have of an architect's temptations and responsibilities, and is worthy on that account of unprejudiced consideration. The report, as was expected, entirely exonerates the Supervising Architect from the absurd charges of incompetency and corruption brought against him, but expresses the opinion that he permitted himself to use too great discretion in awarding public work in accordance with his own opinion of the merit of different contractors, rather than by the method, legally prescribed, of public advertisement and competition. It is not claimed that the public has not been well served, and at the lowest possible cost, but the assumption by a public officer of a greater discretion than the law allows him seems to the committee a serious grievance.

TO all architects, on the contrary, as well as to many outside the profession, this complaint of the committee will seem at first sight very ill-founded. In the matter of safes, for instance, it is shown that the Supervising Architect was able to make privately a contract much more advantageous to the public than could have been obtained by putting the work out for competition, and in ordinary business it would be ridiculous to prohibit an architect from making the best terms he could for his employer in matters so entirely within his knowledge, in any way he might see fit. In the same way a certain kind of elevator having commended itself to his judgment, and to that of a committee of experts appointed by the Government, the Supervising Architect might naturally consider himself authorized to purchase such elevators, at the most favorable price he could, whenever he needed them for the public buildings, and would be very likely to think an annual advertisement for elevators, of a kind which only one manufacturer could furnish, an absurd farce; but the committee does not sympathize with this view, and considers the annual advertisement a necessary form, even though the result of the competition might be always the same. That the result of the discretion assumed by the Supervising Architect has been on the whole advantageous to the public treasury no one, familiar with building matters, can doubt for a moment, and in private business such authority properly belongs to a professional adviser, and is necessary to his efficient service. In public affairs we have, however, to remember that official conduct cannot be too circumspect and exact, and that scandal, and even real corruption, can be best avoided by the adoption of methods, in all the details of public service, by which every step shall be definitely authorized, or in accordance with well-known precedent. If the cost of administering a public office in this way is greater, as it probably would be, than that of a private business of the same importance, there are counterbalancing advantages upon which the committee is quite justified in insisting.

THERE is another reason for limiting the discretion of the Government Architect to the strict letter of the law in regard to advertising public contracts, which seems to have escaped the notice of the newspaper correspondents, although it certainly seems to have been in the minds of those who framed the law. To illustrate this by an example, it is quite possible that immediately after the competitive trial of elevators, which resulted in the selection of a certain variety as the most suitable for the public buildings, a new variety might be invented, or an improvement made in an old one, which would render it superior even to the kind previously selected by the experts. By the public advertisement and competition prescribed in the law the inventor of the improved device would within a year, at most, be afforded an opportunity to submit his invention, and to secure its adoption if it should prove to be really superior to all others, while a system of awarding contracts quietly for an indefinite period to the maker of an elevator once officially approved would debar the author of meritorious improvements from offering them. It seems, perhaps, a little imprudent to make the public building service a field for the experiments of ingenious citizens, but the equal right of all ingenious citizens to have their inventions adopted if they deserve it is of more importance than may at first appear. On the whole, the action of the committee in calling attention to these considerations seems reasonable enough, and it certainly casts no reflection upon the present Government Architect, who is to be congratulated upon the thoroughness with which his skill and integrity are vindicated by the report.

IT would seem that the people of New England have not wholly lost that intellectual activity and fondness for innovations which were once so characteristic of them, if we may judge from the account of some industrial experiments which have been recently made in a quiet way among them. Every one knows that one of the principal industries in that portion of the country is the manufacture of shoes, and most people will remember that the operatives in the shoe factories have of late years been engaged in frequent disputes with their employers, to the injury of both. In consequence, probably, of these troubles, a movement has recently begun for manufacturing on the co-operative plan, and several establishments have already been organized in this way, and have carried on a successful business. The scheme of organization is very simple. The capital, which is fixed at a modest sum, is divided into two or three hundred shares, at one hundred dollars each, and no person is allowed to own more than ten shares. This gives a corporation composed of perhaps fifty or sixty persons, most of whom are interested in improving the value of their property by their own exertions. The membership is not restricted to the persons immediately engaged in the establishment, although these, understanding the value of the shares better than any one else, would naturally be anxious to secure as many of them as they could pay for. A certain portion of the capital, amounting to ten per cent or more, is set aside as a reserve fund for contingencies, and the remainder invested in stock and machinery under the direction of the Board of Managers. All the factories carried on in this way are said, so far, to have made good profits, one of them in Stoneham, near Boston, having paid forty per cent on its capital as a dividend for the past year.

A RATHER unexpected turn is likely to be given to the study of the so-called bacteria of the blood, if certain discoveries of Dr. Grigg, of Buffalo, should be confirmed. This gentleman announces through the Associated Press that by simply boiling healthy blood he has obtained all the forms

of bacteria, and on repeating the experiment with the washed fibrine only, he found that the threads of fibrine separated into short threads and granules precisely imitating bacteria as seen in the field of the microscope. Dr. Grigg then placed fresh healthy blood in a warm place, and allowed it to stand and decompose for two months, when again the fibrine threads were found to be separated into bacteria-like forms. Naturally the experimenter believes that these results indicate an error in the theories hitherto received on the subject of blood-ferments, and, for the general good, invites all microscopists interested in the subject to repeat his tests, diversifying them as much as possible, so that the greatest amount of evidence can be collected.

THE Technical Commission for the improvement of the sanitary condition of Paris has decided to recommend certain reforms, the description of which reads rather curiously to us, accustomed to the refinements of American and English sanitation. The first article of the "Resolutions" of the Commission advises that "in every house there shall be a water-closet for each tenement. The water-closet may, if necessary, be placed outside of the tenement, provided it is upon the same story." The second article goes on to say that "every water-closet shall be supplied, either by means of reservoirs or by a pipe, or in some other way, with a quantity of water sufficient to assure a minimum discharge of ten quarts per day for each person using it." The third article says that "every water-closet shall be furnished with a trap under the bowl." It may at least be said that these provisions are good as far as they go, but then, it must also be acknowledged that according to our ideas they do not go very far, and the Parisians have a wide field before them for the development of the plumber's art. It is gratifying to observe that the Commission considers it "necessary to pursue the suppression of the system of fixed vaults," and recommends that henceforth no vaults shall be constructed under houses except by special permission, in cases where discharge of house wastes into a sewer would be impracticable.

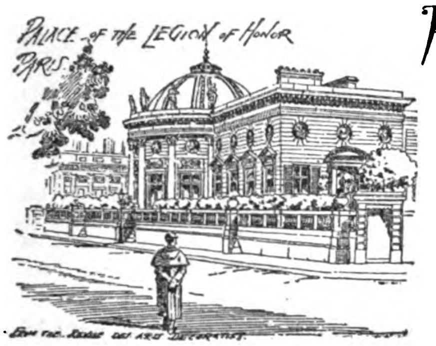
M. EDOUARD MARIETTE writes to *Le Génie Civil* an account of the modern practice in Egypt in the construction of the great baths which play so important a part in the daily life of the more civilized Southern nations. It seems that in Egypt the planning both of public and private baths is usually left to specialists, who have reduced their art to a fixed system. The first step, in the construction of the suite of rooms constituting the bath attached to a private house, consists in the establishment of a water-tight basin, of brick laid in a mortar of lime mixed with the fine silicious alluvium of the Nile. This mixture forms a kind of cement, and as the masonry is made from nine to twelve inches thick, the basin, after plastering the surface with mortar, is sufficiently impervious for its purpose, which is simply to prevent the infiltration of water from above into the soil beneath, and among the stones or brick of the foundation. So great is the importance attached to this protection that in the better class of buildings a sheet of lead is often laid over the surface of the brickwork, in place of the coat of mortar. Whatever may be the material of the superficial covering of the basin, the next operation is to build upon it a number of brick piers, about twenty inches high, and the same distance apart, on which are laid flat iron bars, running both directly and diagonally from pier to pier, and forming a net-work, on which are placed large, flat stones, these again being covered with a pavement of tiles or marble bedded in mortar.

IN this way a chamber is formed under the floor of the bath, accessible in all directions for sweeping out, or other purposes, into which are discharged the smoke and heated gases from a furnace placed in a room just outside. To withdraw the smoke after its heat has been transferred to the floor of the bath above, a number of flues are built in the walls of the superstructure, separated from the interior of the room only by two inches of brick, so as to allow the last remaining warmth to be utilized. Like the chamber beneath the floor, the flues are arranged so as to be readily cleaned, the fuel used in Egypt being of such bad quality as to make it necessary to sweep out all the smoke passages at least once in every six months. The chamber warmed in this manner forms the centre of the group of apartments, and is usually covered with a dome of plaster-of-Paris, made by pouring liquid plaster over a form of earth built on a wooden scaffolding. The subordinate portions of the bath generally consist, for private houses, of a dressing-room, placed near the entrance, a *salle de repos*, between the dressing-room and the bath proper, and the furnace-room. The last, besides the fireplace for heating the hypocaust of the bath, contains a large boiler, the lower part of which is made of copper, and the upper of lead. This stands over the furnace, and to assist in diffusing the warmth of the fire through the water, an upright rod of copper is fixed in the boiler, with several horizontal arms, which conduct in all directions the heat imparted to the central stem. The steam from the boiler escapes into the main bath, filling it with warm vapor as required. Benches of marble and wood are provided, both in the main hall and the smaller rooms, and either in the main hall or in alcoves opening out of it are placed basins supplied with hot and cold water. The decoration of the whole is formed by color or relief work, upon a coat of plaster, mixed with oakum or tow. Light is admitted to the central room in the daytime through openings of various shapes in the dome, filled with glass "bull's-eyes," and a feeble illumination is given at night by means of a lamp, set from the outside in a little cupboard, enclosed on the side toward the bath by a glazed sash.

THE remains of a bridge, which once crossed the Rhine from Mentz to Castel, have recently been made the subject of an antiquarian exploration, and the piles under some of the ancient piers were drawn up and carried to Berlin. They proved to be of various kinds of timber, some being oak, others elm, and others beech. The most interesting feature of the account is that as the bridge which they supported is positively known to have been in use during the wars of Julius Cæsar, B. C. 53, the piles must have been in place for more than nineteen hundred years. The inner portions of the timber were perfectly sound, so that some was immediately utilized for making pieces of furniture, and it is said that even the iron shoes with which the points were armed remained in place. We think that this is the most striking example yet observed of the duration of timber under water. The piles on which the church of St. Mark, in Venice, was built have been supposed to be the oldest in existence, but those of the Mentz bridge are more than twice as old. It is remarkable also that the timbers of beech, which is one of the woods most subject to decay in air, were preserved so perfectly that the variety could be readily distinguished, some being of white and others of the red beech.

SOME interesting statistics are given in the *Revue Industrielle* concerning the comparative durability of iron and steel rails, deduced from the accounts kept by the engineering department of the Grand Central Railway of Belgium. From these it appears that the failures of iron rails begin immediately after they are laid, usually from exfoliation, or in consequence of defects in manufacture showing themselves in some other way, so that the work of replacing them goes on continuously, the whole being renewed by the end of fifteen or twenty years. With steel rails the loss was found to be for twelve years almost nothing. Out of five hundred and twenty rails laid in 1869, only one had been renewed up to the first of January, 1882, and this one was broken by an accident; but before the year 1882 was over, two hundred and fifty-seven, or nearly half, of the rails of 1869 were condemned and replaced with new ones. The reason for discarding the old rails was that their surface had been worn away to a depth of thirteen millimetres, which is the limit of service adopted by the company; and the fact that half the rails laid thirteen years before reached this limit at about the same time is of much interest as showing the uniformity of wear in the metal. Under ordinary circumstances the life of good steel rails would be much longer than thirteen years, but in this particular case they were used upon a short piece of track, with a grade of one hundred feet to the mile, and subjected to the effect of the movement of thirty heavy freight trains a day, descending the steep grade with the brakes on. Iron rails on this section of the road had lasted generally about three months, and of the very best hammered German rails, which were tried before the steel, one-half were replaced at the end of a year, and the whole in about three years.

ARCHITECTURAL COMPETITIONS.[1]



ALTHOUGH once deemed a professional necessity, the practice of "architectural competition" is destined eventually to become the refuge of the incompetent, the inexperienced, the indolent and the unscrupulous. Like the weeds that are shipped with good seed from abroad, the bad custom came over so mixed with the good that during our more dependent and colonial years it was supposed to be a necessary element of ordinary practice. Although boldly denounced in the home of its origin by some of the foremost architects of the day, including two presidents of the British "Architectural Association," and although the great majority everywhere look upon it as more or less injurious to the best interests of all concerned, it is still justified and supported by many as a venerable public and professional necessity; an equally venerable method for the discovery and development of youthful genius; and also on the ground that its acknowledged defects can be remedied in due time by the united efforts of the people and the profession.

Mere antiquity claims little consideration unless coupled with real merit. Although the remote past furnishes the richest materials for the study of art it is no guide for the architectural practice of the present. The ancient foreign aspect of art competition has as little to say to the modern practitioner as the Greek games, or the brutal sports of the Roman amphitheatre. Just as good work was done in the elder days without the stimulus of strife and speculation. The recluse in his cloister, the household servant of pope or cardinal, worked with more than the skill of the public competitor.

In much the greater part of his relations to the world, the architect of to-day is as free from limiting antecedents as the promoter of railroads and telegraphs. The half-equipped and one-sided men are the most nearly allied to the past. The dreamer of wild and impracticable fancies traces his origin to his mythical monkish brother of mediæval days, while the builder architect travels back to the same source to find inspiration for his latter-day enormities in his descent from the brotherhood of "free masons." The well-balanced man, on the contrary, leaves the dead past to bury its dead architects, and studies not their methods of practice but their monuments.

Modern competitions abroad, especially in England, have little of good to teach us. A volume might be filled with their absurd and often disgraceful record. Our brethren of the "old home" must be a very testy body of men to judge by the criminations and recriminations of the correspondents of their professional journals. The melée which follows the announcement of the award of the "assessor" in a "competition" reminds one more of the prize-ring than of any more dignified calling. To a non-believer in such contests some of the late ones seem absurdly funny. Passing by the extended and bitter controversies of the larger tournaments, which would have afforded admirable occasion for the work of "congressional investigating committees," we find a late instance in which some church building promoters were eagerly offered designs by eighty-five architects represented by more than five hundred drawings prepared at an estimated cost of $8,000. Before the award was made it was ascertained that the projectors of this religious undertaking, in which it was intended to invest only about $60,000, were not in possession of funds sufficient to commence the work of building, so that the remote chance of a beggarly premium was the high goal for which all this loss was suffered. This was a competition with all modern improvements, including a professional "assessor." Whether the "assessor" knowingly lent his name to the sharp game of the promoters does not appear. In another instance, in order to obtain the commission for the restoration of a cathedral, an architect in good standing offered as a bribe a gratuitous design for a reredos. This offer was speedily "seen" by a provincial competitor, but another provincial "went one better" by inducing a friend to undertake to construct the reredos, providing "his man" was employed on the restoration; this offer, of course, carried the day, and the man with the heaviest backer won.

These are not extreme examples, and they abound even after half a century or more of attempted regulation and reform. In England, certainly, the competition system is rotten to the core. Like some other phases of English practice it should teach us what to avoid.

The general history of architectural competitions in America has been to the profession and to the public a record of humiliation, mortification and pecuniary loss. Little else could be expected of a custom founded on the absurd supposition that a building committee, board of trustees, or an individual client, can secure the best design, construction and administration of a building by the employment of the architect whose name is appended to certain sketches which are most admired by variously constituted and more or less qualified judges. Practices to which the members of no other profession would stoop come to be encouraged and justified as necessities, and serious work gives way to feverish speculation. All the evils which hamper the efforts of the regular architect cluster about, or originate in competitions. The want of honorable consideration and respect in some communities; the often futile efforts to obtain fair and equitable compensation for painstaking labor; the low standard of acquirement arising from the prominence given to the chance element in practice; and the growing impression that hard work is not so essential to success as influence combined with tricky design and superficial draughtsmanship. That occasionally a good building is the result of a competition is nothing to the question. It remains none the less true that to the public and the profession at large the practice has proved injurious. It is not a bad saying of the French army that "every private soldier carries a field marshal's baton in his knapsack;" but we press the principle too far when we encourage our office-boys to think that "capitol" and "state-house" commissions are within their early reach, as the awards of happy accidents rather than of patient and self-denying toil. The lack of earnest and faithful workers in the lower ranks may well be traced to this pernicious teaching. The standing of the profession with the public has been seriously lowered by the blunders of incompetent practitioners brought prematurely to the front by the competition system.

Let us not delude ourselves by shifting the responsibility of these and kindred evils on to the broad shoulders of the public. The people of America derive much of their information on such matters from their architects, and their representative journals. There is ample evidence that the best of our clientage are willing to pay liberally for what they are led to believe is the best expert service.

If in the train of mismanaged public competitions follow worse managed private ones, and if from the lessons of these follow undignified solicitations of employment; if men not lacking in self respect under ordinary conditions are constrained to fawn and court indignities; if the feeble and inexperienced resort to competition in rates of compensation as well as in merit of design; and if these irregularities sometimes lead to the scamping of both plan and construction, and finally even to bribery and corruption, let it be remembered that we hold to a great extent the position of teachers, and that a people who take readily to speculation of all kinds are apt pupils in these matters. Already the inventive genius of the West has evolved new phases of competition. Architects have been invited, and some of the so-called have accepted invitations to take part in ventures from which even our hungry foreign brethren would recoil in dismay. There is as yet no case on record where the craft has been induced actually to build state-houses "on approval," but the practice is fast tending towards such a consummation.

It has been wrongly claimed that the interests of the junior members of the profession are served by competitions. This, like many other things that hamper us is an imported mistake. In a community where only the aid of the sign painter is requisite to constitute an "architect," where every village newspaper gladly chronicles the most crude and imperfect development of local talent, and where technical education is within easy reach of all, there is little danger that future Wrens and Le-Ducs will "be born to blush unseen, and waste their sweetness" at the carpenter's bench. There is room in America to-day for all the skilled architects that our schools and offices can furnish, and the demand is steadily increasing. If we do not occupy the field with trained men the engineers and builders will do so as best they may, and we can have but ourselves to blame for it.

There is too much of the gambling fever in our national air. Its infection to-day threatens legitimate business, and we are not exempt from the losses indirectly entailed by it. Enterprises less reputable than gambling are dignified by the name of speculation, and short roads are eagerly sought which sometimes end in fortune, but often in the felon's dock. The followers of law, of medicine, of religion and art cannot be too careful to keep clear of popular vices of the day, even avoiding the appearance of evil. Temporary success can never justify false methods.

The teachings of public competitions have encouraged the common fallacy, which has even found believers in our courts of justice, that architects are solely draughtsmen, and that drawings are their only products on which a value can be placed. Following this has naturally come the client's claim to the drawings as the only tangible results of service. The charm of design, the cleverness and method of plan, the skill and science of construction, the thousand items of excellence, the result of thought, study and experience, and more than all the slow mastery of the combination of all these, the expensive accumulation of years of arduous toil, become as nothing opposed to the clever picture that has caught the unreasoning popular fancy. If the result is conspicuous failure the obvious lesson that an architect should be judged by what he *builds* seems to make but little impression on the sufferers. In the present state of things even the representative picture may have been bought or stolen. It is a notorious fact that some of our most successful competitors are not even ordinarily competent draughtsmen and designers. It takes but little wisdom to forecast a professional future in which the clever designer and the unscrupulous manipulator shall be encouraged to push themselves to the front.

It is disheartening to reflect on the time and money that have

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[1] A paper read by Mr. John A. Fox, F. A. I. A., at the late Convention of the American Institute of Architects. Mr. Fox prefaced his paper with the remark that he had never taken part in a competition, and therefore would be understood to oppose them simply on general professional grounds.

been squandered in these unsuccessful and discreditable ventures, and of the great benefits that might have accrued from the proper use of such an amount of labor.

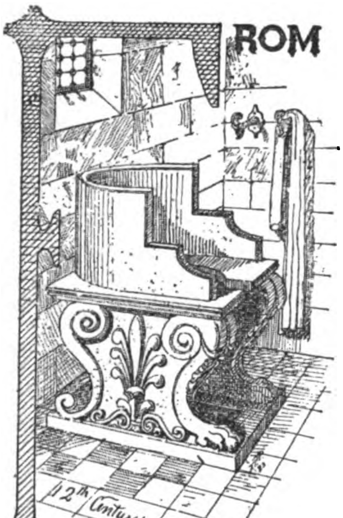
The profession of the architect with its heavy responsibilities of life and property is a wearing one at the best, and it is foolish to add to its embarrassments the anxieties and disappointments of needless strife. We are brethren laboring for common ends, and those worthy ones. The best work is of slow growth. A great project should be wrought out calmly. Bustle, hurry and rivalry of the meaner sort can only retard its proper development. The intimate and friendly relations of employer and employed, the thorough knowledge of uses, means and materials; these and many other things essential to real success are daily sacrificed to a professional craze. The fact that such methods have failed conspicuously in the arts of painting and sculpture, where their chances of success should have been tenfold greater, should carry some weight.

In the extreme West it is said that lawyers advertise, compete in rates, and resort to other disreputable devices to obtain employment. In the advance, and on the outskirts of a profession the guerrilla and free lance figure conspicuously, but they have a very demoralizing element when mingled with the main body. It is less difficult for an employer to make choice of an architect than of a doctor or lawyer. The acquirements and abilities of the former are more easily gauged and measured than those of the latter, whether it be at the beginning of a career, or in the midst of one. A profession that adopts methods foreign to all the professional practice will find it hard to maintain a high standing with the public.

The practice of competitions, borrowed from abroad, has not as yet taken a very firm hold among us. A moderate effort made at little sacrifice on the part of our leading men; an expression of disapproval by the Institute and other societies; an abstinence from such ventures by the well-established members of the profession, would go very far towards ridding the public and ourselves of such methods altogether, and the final result would be to place our work on the same basis as that of other professions, and to give sterling merit a fair opportunity to find its full reward in due time under conditions alike honorable to both architect and client. Then we could hope that the architect of the future might claim a better title to the name, and become what another has fitly said he should be, "a true artist, a skilful draughtsman, a mathematician, a person endowed with considerable scientific knowledge, a mechanician, an arithmetician, a man of probity, and a gentleman."

SANITARY PLUMBING.[1]—III.

THE WATER-CLOSET.



FROM WHATEVER standpoint we judge it, whether from the extent and importance of the work it has to perform; from the inconvenience which would be felt by its omission; from the efforts bestowed upon its improvement by inventors; or from the number and costliness of the materials used in its construction, and in that of the apparatus required to operate it, the water-closet must be accepted as unquestionably the most important of all our plumbing fixtures, and as such will be first considered.

No article of plumbing — perhaps no article of manufacture — has within the last fifty years received more attention from inventors, and been the subject of more patent grants than the water-closet; and yet it must be admitted that even the best of those now in use have many evident and serious defects. The object of the water-closet is to furnish a convenient, simple, economical and durable vehicle for the immediate, complete, odorless and automatic removal of household wastes into the soil-pipe, without permitting a return of sewer-gas through the channels of removal.

Common defects among the most approved kinds are the ease with which their water-seal is destroyed by evaporation, siphonage and suction; imperfect flushing; the want of proper provision for making secure connection with the waste-pipe; unnecessary complication and multiplication of parts; wastefulness of water; and noisiness in operation, which often prevents their use in parts of the house where, and at times when, guests are liable to be present. Strangely enough, too, the closet which at the present day is most popular is the most defective of all, and in fact contains nearly every defect that is possible with water-closets; so that an enumeration of its defects would give us a complete list of all the evils we should guard against.

The information which will enable the public to distinguish most readily between the various fixtures they are called upon to select is best obtained from a classification of the desiderata to be sought, rather than from a detailed description of the individual closets themselves. A second classification of distinguishing types will be added, to illustrate and explain the first division; but no criticism of any individual fixture now in use will be made, such personal reference to the appliance of any special patentee or manufacturer being in the present case both unnecessary and undesirable.

CLASSIFICATION OF REQUIREMENTS.

The ideal water-closet should possess the following characteristics relating to: 1, the method of flushing; 2, form; 3, material; 4. construction, including methods of connecting with soil and supply pipes, and provisions for ventilation; 5, cost; and 6, appearance.

1.— *The Flushing*

(*a*) Should be so contrived as to thoroughly remove all waste matter and carry it completely into the waste-pipe;

(*b*) Should begin to act instantaneously on operating the pull;

(*c*) Should pass through the closet rapidly, and concentrated in a mass or large volume so as to act powerfully in flushing the closet and drains;

(*d*) Should thoroughly scour all parts of the closet and trap;

(*e*) Should act noiselessly;

(*f*) Should be effected by a single simple movement, and require the minimum of strength or effort;

(*g*) Should come from a special supply-cistern, and not from the water-main;

(*h*) Should be effected without spattering;

(*i*) Should do its work with the minimum of water, and,

(*j*) Should regulate the quantity of water used, (one gallon properly applied being ample) allowing no more and no less to flow, however long the pull may be held.

2.— *The Form*

(*a*) Should be as simple as possible, and the extent of surface to be flushed as small as possible to facilitate the scouring, and there should be no surface, angle, or corner, which does not receive the scouring, and,

(*b*) Should be compact, allowing the closet to be set in the smallest possible space.

(*c*) The bowl should be elliptical, and not less than 12 inches on its longest axis, nor more than 10 inches on its shortest axis.

(*d*) The depth of the bowl should not exceed 6 inches from the top of the wooden seat to the level of the standing water.

(*e*) The sides of the bowl should be nearly perpendicular from the top, to near the level of the standing water.

(*f*) The form of the bowl and trap should be such that the whole interior of the former, and the deepest part of the latter may be visible and accessible from the outside.

(*g*) The form of the closet should be such as to allow of its use as a slop-hopper or urinal, as well as water-closet.

(*h*) The bowl should have at its bottom a body of standing water, at least 8 inches in diameter, and over an inch deep, to receive and deodorize the waste matters, and prevent their striking any dry surface to which they might adhere.

(*i*) The form of the closet should be such that its point of connection with the soil-pipe is several inches above the finished floor, and is independent of any possible movement thereof through expansion, contraction or jarring; and, for flexibility, a lead-pipe should be used between the closet and the soil-pipe.

3.— *The Material*

Should be tough and durable, with a perfectly smooth surface, which cannot be injuriously affected by the waste matters, changes of temperature, or any of the influences which are brought to bear upon it.

4.— *The Construction*

(*a*) Should be as simple as possible, and have no pan, valves, gates, plungers, or other unnecessary obstructions to the water-way, and,

(*b*) Should be such that the water in the trap cannot be destroyed by evaporation, siphonage or suction.

(*c*) The bowl and trap should be made of a single piece, so avoiding joints.

(*d*) The bowl and trap should be encased in iron, to give the proper strength and protection, and to admit of a perfectly tight and secure connection with the soil-pipe without the danger of fracture.

(*e*) The frame should be strong enough to sustain both the closet itself and the wooden seats, without the help of wooden or other external supports.

(*f*) The construction should be such as to reduce the labor of setting to a minimum, and to enable it to be disconnected at any time with facility, and without other tool than an ordinary screw-driver or wrench.

(*g*) The construction should provide for thorough ventilation.

5.— *The Cost*

Of material, manufacture and setting should be at a minimum.

6.— *The Appearance*

Should be neat and inoffensive, so that it will require no casing or wood-work to conceal it.

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[1] Continued from page 129, No. 403.

At first thought some of the above requirements appear to be incompatible. It would seem as if a flushing which should be sudden and powerful, without using valves or plungers could hardly be noiseless. Nevertheless the co-existence of these desiderata is quite possible, as will be hereafter shown.

Water-closets may be divided into four classes or types.

I. *Pan-Closets*, or those which have a movable pan or saucer below the bowl to receive the waste matters, and form, with the bowl, a water-seal.

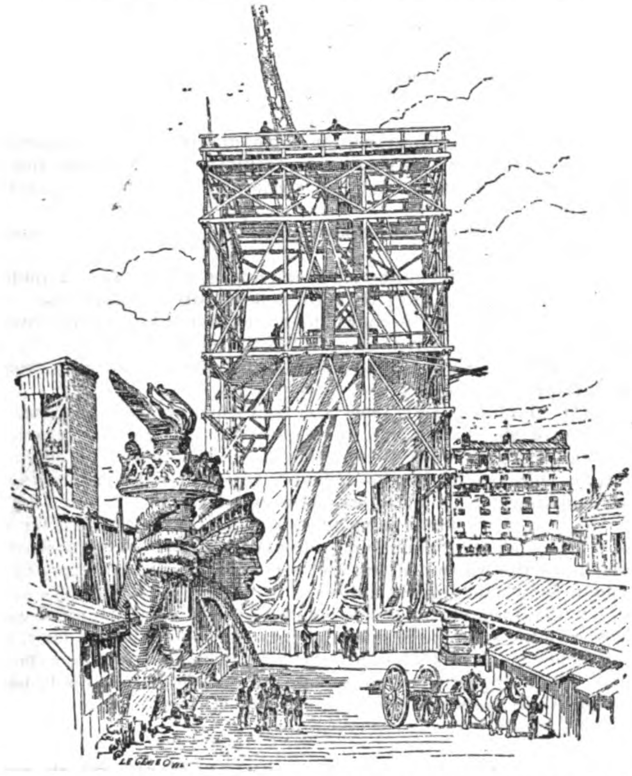
II. *Valve-Closets*, or those which have the outlet of the bowl closed by a movable valve or plate, usually held in place *under* the outlet by a crank or spring, and intended to be water-tight.

III. *Plunger-Closets*, or those which have the outlet closed by a plunger or plug fitting over or into it usually held in place by its own weight, and intended to be water-tight.

IV. *Hopper-Closets*, or those which consist of a simple bowl and water-trap, and are independent of pans, valves, plungers, or other mechanical contrivances in the water-way.

It should be remarked here, that the overflow-passages of valve and plunger-closets render them practically (so far as the dependence upon the ability of a simple water-seal to keep out sewer-gas is concerned) hopper-closets; since the overflows are usually provided with a water-trap only. The real use of the valve and plunger is not to form a security against the entrance of sewer-gas, as is commonly supposed, but to hold a certain amount of water in the bowl, so long as they can be kept water-tight.

BARTHOLDI'S STATUE OF LIBERTY.[1]—II.



IT was during a trip to the United States, in 1871, that M. Bartholdi first conceived the idea of erecting a statue of Liberty on New York Harbor, facing the ocean and looking towards France, that it might typify the glorious memory of the part which France took in the war of Independence and the foundation of the American Republic. For the realization of his project, the artist had only his own faith in his work and the support of his patrons; but he possessed the address to interest others, and the Franco-American Union was soon organized for the execution of this grand historic monument.

The one hundredth anniversary of the independence of the United States furnished, moreover, the occasion for uniting the two nations in one common manifestation. France offers the statue, the United States provides the pedestal.

M. Bartholdi set about his work and translated his idea into a design worthy of its destination, and which received all suffrages. He wished to make it large—larger than all the giants which man had yet constructed, and in fact, his work exceeds the maximum of the proportions that tradition attributes to the Colossus of Rhodes.

Conceived by the sculptor in a moment of artistic elation, the statue, of course, presented considerable difficulties as to the means of carrying it into execution, and required labor of a kind absolutely peculiar to itself. It was decided to construct it of copper *repoussé*, supported by an iron skeleton. The *repoussé* process allows of the production of pieces of large size and yet of the smallest possible weight relatively to their volume. It employs laminated plates, which have the double advantage of solidity and lightness, together with qualities of resistance and durability superior to those which the same amount of metal would have if simply cast. Besides, to construct in bronze a statue of large dimensions, it is necessary to cast it in several fragments, whence result numberless joints, which are often sufficiently imperfect because of shrinkage. The "Virgin of Puy" is only 16 metres [52 feet] high, and yet a hundred thousand kilogrammes of bronze were needed for it. The statue of Liberty is to be 46 metres [149′ 5″] high. What an enormous weight of metal would it have been necessary to devote to its casting! Copper *repoussé* presented, then, great advantages, not only from the point of view of economy, but also from the point of view of feasibility of execution. It is, besides, much more original and more artistic, since it is entirely hand-work. M. Bartholdi had, moreover, the example of the "St. Charles Borroméo" by Il Cerano, and that of the "Vercingetorix" by Millet.

He applied to MM. Gaget, Gauthier & Co., at the workshops in which this latter statue had been made. It was at this large establishment, also, that the *repoussé* copper work of the exterior of the dome of the auditorium of the new Opera-House at Paris was made, as also those of the lateral pavilions, and the large bas-relief above the gate of the Carrousel at the Louvre, the statues which ornament the *flèche* of Notre Dame and that of the Saint-Chapelle, also the "Fame" which crowns the central pavilion of the Trocadéro, and so on.

The first fragment that was made was the arm and torch, which was sent to the Centennial Exhibition at Philadelphia in 1876. Next, the head was constructed, which was shown at the Exposition Universelle of 1878. The resutls obtained were excellent, and from that time on the work could advance boldly. We will now explain the method of carrying this gigantic work into execution.

When the sketch-model was finished, M. Bartholdi executed a study 2m. 11 in height from head to foot. This model was one-sixteenth the full size. Next, this model was enlarged four times. Thus was obtained a quarter-size model, which measured 8m. 50, which allowed a fresh study, since the eye could still embrace it all. To reach the scale of execution the method of "copying by squares" was employed, in this way: The quarter-size model, after having been studied and remodelled by the artist, was divided into sections. Upon a base four times as large as that upon which rested one of these fragments of the model were laid off very exactly all its salient points by means of plumb-lines. In this way a sort of imaginary solid was arrived at, formed by a multitude of vertical lines, and within which must be formed the statue, or portion of the statue, at full size. It was then possible to determine the principal points of the fragment with reference to these vertical lines by mentally determining from point to point the horizontal sections of the quarter-scale model. This is, on a very large scale, the process that is used for reproducing the model of a mountain from the contour lines drawn on a plane.

These sections were thus reproduced with mathematical exactness at four times their size. Upon these square bases, divided and properly numbered, the sculptors worked in plaster the full-size model. They determined the enlargement by measures taken by the compass from the plumb-lines. The principal points being determined in the horizontal sections, they were joined by a framework of wood and laths. They then covered with a coat of plaster the wooden form thus sketched out, verifying the measures already established; and then followed the detailing and finally the modelling of the surface. Very simple in theory, this method demands in execution a consummate ability on the part of the workman. Each nail-head, or "bench-mark," as it were, necessitates six measures,—three taken on the model and three on the enlargement,—to say nothing of the measures for verification. The finished courses or sections have an average height of 3m. 40, and in each course there are about 300 principal points and 1,200 secondary points, to determine which required about 96,000 measurements.

The modelling upon the plaster at full size having been finished, it was next necessary to construct a mould of wood on which could be hammered the sheets of copper which were to form the statue. This was a very complicated piece of wood-work, analogous to those which are met in the construction of moulds for foundry work. As in their case, these moulds must be so made that they can be easily detached from the model, and it was also necessary that they should be so made that the copper could be easily withdrawn from them.

Following the least tortuous lines of the mould, generally those in relief, like the crests of a mountain range, they laid the main pieces of the framework, properly fashioned, and connected these by transverse pieces, the intervals being filled by lattice-work more or less closely laid, according as the part to be reproduced was more or less in relief. All these pieces had to fit exactly the form of the plaster model and so constituted a rigid mould, whose appearance recalls sufficiently well the contour lines and hatching on an ordnance map. These moulds were large or small, according to the difficulties of the work. Next, several of them were fastened together to facilitate the adjustment of the plates of copper. These plates have on an average a surface of from one to three square metres. It is difficult to procure them more than 1m. 40 wide. The workmen pressed the sheets into the mould by levers or the blows of a mallet, and the work was completed by rapid strokes of smaller mallets and rammers, the whole being verified with the greatest care by means of templets of wire or sheet lead, which were carefully fitted to the original model.

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[1] Translated from *Le Génie Civil*. Continued from page 127, No. 403.

When there were pieces of a complicated shape to make, the copper was heated at the forge and brazed by aid of the blow-pipe. From point to point the copper plates are provided with iron bands to give them rigidity. These bands are forged to take the shape of the copper when this has been entirely modelled, but they are to be definitely fastened to it only when the statue is erected.

The copper shell, hammered as we have just explained, is composed of about three hundred pieces, weighing altogether 80,000 kilogrammes [88 tons]. It is to be supported by a framework of iron which weighs 120,000 kilogrammes [132 tons]. For putting the statue together at the workshops, the sheets of copper are fastened together simply by means of a few screws. When it shall finally be erected in America, the plates will be fastened together by means of flush-headed copper rivets, which will be entirely invisible from the outside. These rivets are 5mm. thick and are about 25mm. apart. As the sheets will be joined with a feather-edge, it will be quite impossible to distinguish the joints even from a short distance, and the statue will appear to be constructed in one piece. The iron skeleton which is to serve as the support for the copper shell has four points of attachment to the masonry of the pedestal. Each of these points will be secured by three bolts 0m. 15 [nearly 6 inches] in diameter let into the stone-work to a depth of 15 metres [48 feet]. The shell is to be fastened to the iron skeleton by a secondary framework of flat iron 50mm. wide by 30mm. thick, which is placed on the interior surface of the copper to prevent deformation.

Two special difficulties were to be foreseen and avoided in this part of the work: in the first place, expansion; this will take place inevitably, but its action will be without inconvenience by reason of the extreme elasticity of the shell and the numberless opportunities for concealed expansion which are afforded by the folds of the drapery. Besides, in order that each metal may expand freely the bands of iron, in place of being riveted to the statue, are simply held in copper chases riveted to the shell. In the second place, galvanic action, whose effect was much to be feared. The sea wind, which always bears a large proportion of salt water held in mechanical suspension and independent of the spray, is one of the strongest agents for starting the action of a ferro-cupric element such as will result from the construction of this statue. Such galvanic action would likewise take place in the presence of rain-water strongly charged with nitrates. One can easily conceive of the intensity of the currents which would be given birth to by a battery of this unknown power. To prevent this, the builders, when the statue is finally erected, will interpose between the copper and the iron, little pieces of copper armed with rags covered with minimum, in the same way that is followed with success in sheathing ships' bottoms.

Never has a colossal statue attained such proportions. From the base to the summit of the torch Bartholdi's statue measures 46 metres [149′ 5″], that is to say, two metres [6′ 6″] more than the Vendome Column, and 34 metres [110′ 6″] from head to heel. The forefinger is 2m. 45 [8 feet] long and 1m. 44 [4′ 8″] in circumference at the second joint; the nail is 0m. 33 by 0m. 26 [10″ x 13″], the head is 4m. 40 [14′ 4″] high, the eye 0m. 65 [2′ 1″] wide, and the nose 1m. 12 [3′ 8″] long. From the crown of the head project five gilded rays. The longest is 3m. 50 [4′ 16″] in length and weighs 74 kilogrammes [163 pounds].

A large number of persons assembled inside the head at the Exposition Universelle of 1878, and quite recently twenty-six persons sat down to breakfast in one of the middle sections of the statue, and the service of the table was carried on with the greatest facility. In the interior of the arm will be arranged ladders, so that the torch may be reached above the hand. A baker's dozen of men can gather here without inconvenience.

Thus, as we have before mentioned, the total weight will be about 200,000 kilogrammes, of which 80,000 are copper and 120,000 iron. The statue, separated into more than three hundred pieces for transportation to the United States, will be set up morsel by morsel upon the pedestal. Some American technical journals have wrongly supposed that it will be erected in one piece by the aid of cranes. This method would be the only one possible if the statue had been cast, or cut out of a single stone; but here, where there is a question only of comparatively light pieces easy to handle and set in place, there will be no excuse for employing the other method, which would considerably increase the expense and the difficulty of properly securing the statue to its pedestal.

Placed on its granite pedestal 25 metres [82 feet] high, the statue of Liberty will form a light-house of exceptional power. From the diadem which crowns the head will shine powerful electric lamps, while the terrace below the torch will be reserved for the lookouts, and in the sub-basement there will be room for a large number of offices. What will be the price of this immense work? This it is still difficult to determine. Delivered at New York, the statue will probably have cost about 600,000 francs [$120,000]. Of this sum — which is merely approximate — 400,000 francs [$80,000] may be charged to the construction of the metal portions. Americans estimate that the masonry will require about the same sum; and from this sufficiently vague data it will be seen that the completed monument will probably cost about 1,200,000 francs [$240,000]. The most liberal subscribers will certainly be the courageous artist, who has generously consecrated to the work his time, his labor and his trouble, and the careful workmen who have not hesitated to encounter the risk of so considerable a task and one so novel from every point of view.

THE ILLUSTRATIONS.

DESIGN FOR THE CLUB-HOUSE OF THE MILWAUKEE CLUB, MILWAUKEE, WIS. MESSRS. SILSBEE & KENT, ARCHITECTS, CHICAGO, ILL.

THIS design is intended for a corner lot, 60′ x 120′, south and west exposure; cost, $50,000. The basement and first story to be rock-faced Connecticut brownstone, and the upper stories of red pressed brick, with a tile roof and wooden bays.

The features of the design in plan are, the arrangement of dining, card, and reading rooms, in common or privately at pleasure, by the form of partition used; the treatment of the entrance and vestibule, and the space given to balconies. The distribution of rooms in the first and second stories is shown by the plans. The chief feature of the basement plan is a large billiard hall; the remainder of the space being taken up by the kitchen, store-rooms, and other rooms needed for the service of the house. In the upper story are about a dozen bedrooms and two parlors.

HOUSE FOR F. S. JAMES, ESQ., OSAGE, ILL. MR. J. J. FLANDERS, ARCHITECT, CHICAGO, ILL.

THIS house was built at a cost of $8,500.

THE BERKELEY ARMS HOTEL, BERKELEY, N. J. MR. BRADFORD L. GILBERT, ARCHITECT, NEW YORK, N. Y.

HOUSE FOR J. E. SCHWARTZ, ESQ., NEAR PITTSBURGH, PA. MESSRS. C. W. ROMEYN & CO., ARCHITECTS, NEW YORK, N. Y.

THIS house is now being erected. The exterior walls are built of Ohio stone, Philadelphia brick, and terra-cotta; the latter being freely used. To cost $50,000.

WATER-CLOSETS.[1] — XIX.

MISCELLANEOUS CLOSETS.

THE two closets of which the following is a description, do not belong to either of the classes which have been enumerated; at the same time they appear worthy of description.

The first is a closet of German pattern, described by Baldwin Latham in his work on sewerage.

German Closet. — This closet consists of a side-outlet hopper. with a siphon trap above the floor, in the bowl of which there is a tilting-basin that can be filled with water. The inside basin conceals the outlet from the bowl into the trap. When this basin is lifted, or tilted, its contents are discharged through the trap into the soil-pipe.

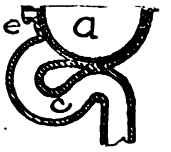

Fig. 199.

German Closet.

a, Tilting-basin.
c, Trap.
e, Supply.

This closet in its manner of operation is almost exactly like the tilting wash-basins patented and manufactured by J. G. Jennings, of London, and I should think the space between the two basins was liable to become very foul.

The second closet that belongs to the miscellaneous class, which I have selected for description, is one invented by John Tylor & Son, of London, in the year 1873.

This closet has a large receiver (in every way equal to, and as objectionable as the receiver under the ordinary pan-closet), into which the bowl projects.

The projecting outlet from the bowl turns at a right angle with itself after entering the receiver, and over its outlet is fitted a horn-like valve which revolves on a short arm and has its upper end open. This valve has a rubber band stretched over its larger end, where it fits against a metal seat that is clamped to the outlet of the bowl. In this manner the water-closet bowl is kept filled with water to the height of the small end of the horn. The over-flow, which, according to Mr. E. F. Bailey-Denton, is now supplied with a ball-valve, takes place through the horn.

There is an inlet cast on the receiver of this closet into which bath or water-basin wastes may be caulked.

Neither of the above described closets probably will ever come into extended use, as they are inferior to most plunger and valve closets, and for this reason far inferior to the class of hopper-closets.

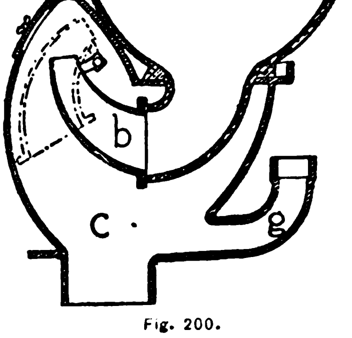

Fig. 200.

Tylor & Son's Closet.

a, Bowl. *b*, Horn-valve. *c*, Receiver. *g*, Bath-waste.

LATRINES.

The class of which the following is a description is in reality a combination of closets, rather than a single one, and is always intended for use in public places, such as depots, schools, hospitals, barracks, asylums, or any place where the usual closet will most

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[1] Continued from page 93, No. 400.

probably be neglected or abused, and where a janitor can take charge of flushing and emptying them; the plug, valve, or tank, which forms the mechanism of the closet are under lock and key, and accessible only to the janitor in charge of the building.

The Lambeth Improved Latrine. — Doulton & Co., of England, manufacture a latrine that consists of a series of stone-ware bowls connected with each other and the main drain by suitable stone-ware pipes. The plunger is a simple hollow one that is formed by an iron tube. The plunger forms the overflow and has a perfect seat over the siphon-trap. The plunger is lifted by a handle that is kept under lock and key by the janitor. The bowls are filled from one cock. When it is necessary to empty the latrine, the handle is raised and the outlet pipe (5″ diameter) is opened, when the contents of the whole row of bowls and connecting-pipes will be discharged through the trap into the soil-pipe, in a few moments. The trap of this latrine is supplied with an inspection-hole, and it should also have, when used, an opening for a vent-pipe on the side of the trap next to the soil-pipe.

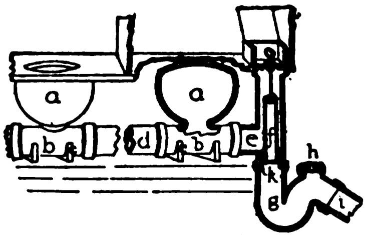


Fig. 201. — Lambeth Latrines.

a, Bowls. *b*. Connecting-pipes jointed to bowls. *d*, Connecting-pipe. *e*, Plunger-chamber. *f*, Plunger. *g*, Trap. *h*, Inspection-cover.

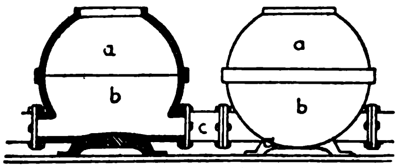


Fig. 202. — Jennings's Latrines.

a, Upper part of bowl. *b*, Lower half. *c*, Connecting-pipe. *d*, Feet.

Jennings's Patent Latrines. — These latrines have been extensively used in public buildings in England. They are composed of bowls made on a special spherical pattern, connected with each other by means of short pipes, the flanges of which are bolted together. The bowls rest on short legs, so the whole system is raised above the floor. The bowl is divided in hemispherical pieces. This form and arrangement is convenient for shipping, as the upper half will set into the lower one. The bowls are furnished either in highly glazed vitrified stone-ware or enamelled iron. The plug is one of Jennings's hollow plungers opening over a simple siphon-trap. The plunger should be raised once a day, and oftener if ample water can be obtained. The water-cock as well as the plunger should be in charge of the janitor.

Tylor's Latrine. — In the year 1873, Tylor & Son, of London, received patents for a latrine of a peculiar form. The bowl is formed so as to set into and rest upon a receiver. This receiver has on each side at the bottom a projecting spigot that could be cemented or caulked into the bell of a pipe. In this way a continuous line of latrines can be formed. The bowl, which is oblong, has foot-rests on each side, and is intended to be used by parties crouching, no seat being provided. The patentee says they were invented for the foreign market. In public parks where water-closet seats would be liable to abuse, or where they might communicate disease, latrines of this or a pattern to accomplish the same end would be found useful.

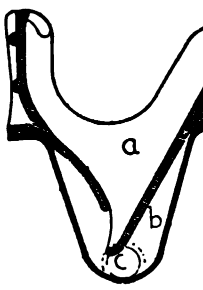


Fig. 203.

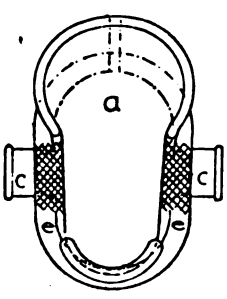


Fig. 204.

Tylor's Latrine.

a, Bowl. *b*, Receiver. *c*, Spigot ends.

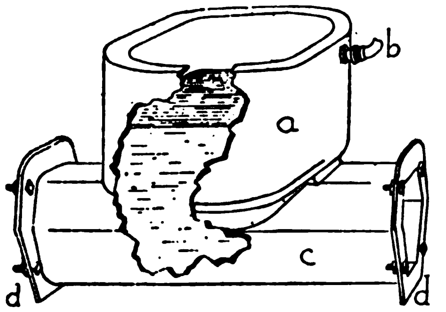


Fig. 205. — Mott's Latrine.

a, Bowl. *b*, Supply. *c*, Connecting-pipe.

Mott's Latrines. — The J. L. Mott Iron Works, of New York, manufacture latrines in this country, of plain, zinc-coated, or enamelled iron. The bowl is formed in one piece with a section of the connecting pipe. The pipes are octagonal in section, and have flanges on the end by which they can be bolted together. The water is held at the same level in each of the bowls by means of a hollow trapped plunger. This plunger as well as the compartment in which it is placed is of the same kind as the one described in connection with Demarest's closet. (Fig. 137.) The same firm manufactures a number of trough-closets. In closets of this kind there is no bowl; but a trough long enough to receive the number of seats desired. The outlets to the trough are closed by a hollow trapped plunger according to Demarest's patent. The plunger operates in a chamber separated from the trough, and it is lifted by a combination of levers, which are clearly shown in the illustration. (Fig. 206.)

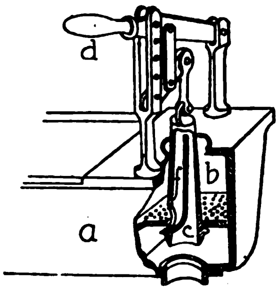


Fig. 206. — Trough-Closet.

a, Trough. *b*, Plunger-chamber. *c*, Plunger. *d*, Lever-handle. *f*, Overflow.

Parfitt's Latrines. — A. G. Myers of New York manufacture a latrine formed in the shape of a long wooden box lined with lead, the cover to this box being divided into as many seats as it is necessary to have. This box is connected by a six-inch outlet and trap to the main soil-pipe. The novel feature in this latrine is the arrangement of a tilting-tank above the end farthest from the outlet. The tank is connected with, and is to be filled from wash-basin or slop-sink wastes. The tank being balanced on journals is so arranged that one end will be heavier than the other when it becomes filled with water. Tilting automatically it will empty its contents into the trough, and at the same time force the contents of the latrine through the trap.

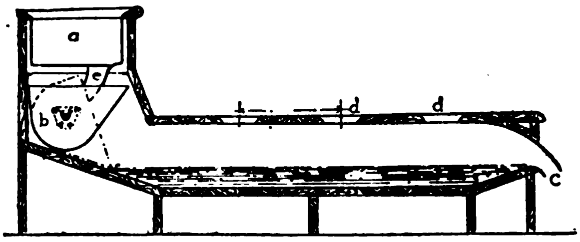


Fig. 207. — Parfitt's Latrine.

a, Sink or wash-bowl. *b*. Tilting-tank. *c*, Outlet. *d*, Seats. *f*, Lead lining.

Mr. E. S. Philbrick describes a curious latrine which is used, and said to work well in Liverpool. The description is taken from the English Privy Council Report. (See *American Architect*, Vol. VIII, No. 328.) In the place of latrines it is now a common, and I think the best practice, to use a row of long or short hopper-closets, either flushed by a tilting-tank, or a tank which is operated by connection with the seat or door of the water-closet room.

A tilting-tank can have its water-supply so arranged that the closet may be flushed at either short or long intervals. The time between the flushes should be regulated according to the abundance of the water-supply as well as according to the use the closet receives.

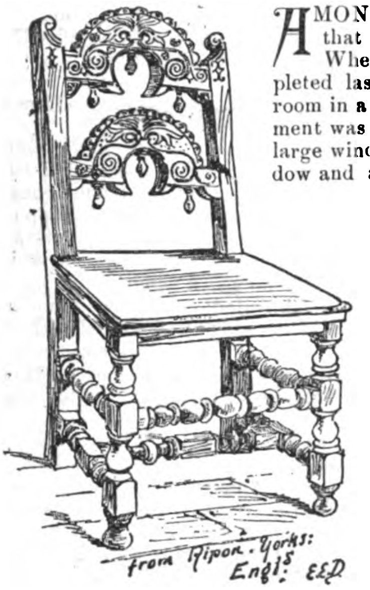
One or two arrangements for opening the supply-valve in the tank automatically will be described farther on. Where rows of either long or short hopper-closets are used in place of a latrine, each bowl has the advantage of a separate and ventilated trap between it and the soil-pipe. While with the ordinary latrine we have each bowl with its connections to become foul, and these foul surfaces will be exposed to the room whenever the latrine is emptied. When foul matter is dropped into one bowl of a latrine, there it must remain, no matter how great or offensive the stench may be.

In hospitals it is often imperative to have the fæcal matter from patients discharged directly into the soil-pipe, in which case a detached closet, one of a row, would be found most serviceable.

I do not think any case could arise in which a row of hopper-closets would not be superior to a latrine unless it were in the case of a public park, where the closet would be open to the most common forms of public use and abuse.

A **Tremendous Irrigation Scheme.** — The most gigantic irrigation enterprise ever inaugurated in the State of California has been commenced in Fresno County, the canal for which will be the largest in the state, and fed by Kings River. The water is intended to irrigate 30,000,000 acres of rich land, at present barren through lack of water. The source of supply of this canal will be higher than any other debouching from the same stream. Its dimensions are: one hundred feet in width at the bottom; levees an average of fifteen feet in height and eight feet wide at the top, broad enough for a wagon road. The depth of the water is expected to be five feet, with a fall of eighteen inches to the mile. The dam in the mountain cañon, whence the water is taken, will be a wonderful and permanent one. It is twenty-five feet high, eight hundred feet long, one hundred and forty feet wide at the base and twenty-five feet wide on top. It is rip-rapped on the inside with heavy rock, and every precaution taken to make it sufficiently strong to securely hold the great weight of water that must be supported. The water is led into the canal from a large headgate, constructed of heavy timber, one hundred feet in width and eighteen feet high. It is planked over so as to make a bridge for heavy wagons and has wings to protect it from the floods. The canal is expected to carry thirteen hundred cubic feet of water per second. — *Los Angeles Herald.*

ARTISTIC EMBROIDERY.—WORK BY THE "ASSOCIATED ARTISTS."[1]—II.



Among the most important works that have been executed in Mrs. Wheeler's ateliers was a suite completed last spring for a large drawing-room in a New York house. The apartment was a rather long rectangle, with a large window at one end, a smaller window and a single door at the other, and a double door in the centre of one of the longer sides. The room was wainscoted in maple and flat pilasters and cornices of the same wood framed and separated the wall panels, in which large embroideries were inserted. The wood was light in tone and by daylight was rather cold and poor in effect; but the room was intended solely for evening use and under artificial light the surface won a richer tone and a more satiny texture. It gave the key-note for a light scheme of color which was admirably harmonious throughout the textiles.

On the longer sides, on either hand of the central door and of the fireplace which faced it, were two embroidered panels, making eight in all. At each side of the end window was another, and opposite, between the smaller door and window was an eleventh of somewhat larger size. All were executed upon thick ribbed silk canvas which formed the background for the designs, only these last being elaborated by the needle. A sort of darning stitch was used — I cannot speak in technical terms — which preserved a very flat effect, simulating thus by hand the appearance of tapestry. The cartoons from which the needlewomen worked were prepared by Miss Dora Wheeler and displayed much fertility of fancy and grace of line. Each showed one or more figures, combined with flowers and other decorative elements, and were akin in feeling to the decorative work of the last century, though by no means definitely copying these in motive. The largest panel represented "The Dance" by a group of interlaced figures. Another showed a nymph rising from the water and dropping pearls from a shell held in her uplifted hand. Others typified Music and bore cherubs and musical instruments. Still another, one of the best, showed an extremely graceful figure of a Psyche breaking from a chrysalis which dissolved in a feathery wreck about her. But perhaps the most successful and individual of all were the two companion pieces at the end of the room, one personifying the "Full Moon" — a nymph sitting on a bank, her feet resting on a water lily while the moon's disk formed a background for her slender outlines, — the other the "Crescent Moon" — a winged nymph resting in the hollow of the orb. This latter was especially beautiful in line, the varied yet harmonizing curves of wings and crescent being particularly well imagined. As has been said the colors employed throughout were very pale and delicate. The background was of pale opalescent tints, and the embroiderers' work toned and melted into it so gently and harmoniously that the lines of contact were not to be discovered by the eye. Each panel was stretched flat upon the wall and was framed, inside the wood mouldings, by a border of pale green plush. The effect, I need hardly add, was quite different from that usually produced by modern needlework and somewhat nearly reproduced that of wall paintings executed in a pale, aquarelle-like scale.

The hangings proper — the portières and window curtains — were very different in kind and character, as rich and sumptuous as the panels were delicate and dainty. Yet the general color scheme was well kept throughout and no dissonance was the result. It was necessary that they should be somewhat more positive than the wall decoration, to give force and accent to the scheme, while not dark or heavy enough to be out of keeping with its most delicate features. Each was surrounded by a border of pale green plush, a little different in hue from those which framed the panels; and each was composed of a rich cream-colored fabric, which was not, however, identical throughout, satin having sometimes been chosen, and sometimes a heavy soft-finished silk. The first curtain executed was from the hand of Miss Carrie Townsend and the others were planned to correspond, though with variety in every case. Miss Townsend chose a satin background which she almost concealed beneath a heavy shower, as it were, of roses, falling from the top of the curtain and straying in the richest profusion over its whole extent. The design was very graceful and the color, in which the palest yellows ran into the deepest pinks, was of the most exquisite quality. Another curtain was of the soft silk fabric, covered with a sort of lattice-work pattern of rose-vines. The silk was turned in different directions in the different panels, thus adding to the play of light and color, the joinings being hidden, of course, by the interlacing pattern. Other pieces showed honeysuckles and various other flowers as their motives, but all were held in the same scheme of color — a scheme which united delicate greens and yellows and pinks and found its strongest note in a pink which approached to crimson.

The thin curtains which were also furnished for these windows were executed on white silk bolting — a fabric which combines great tenuity and transparency with the utmost solidity and evenness of texture and the most beautiful sheen of surface. The design, furnished by Mr. Louis Tiffany, showed myriads of brilliant-hued "darning-needles," massed at the bottom of the curtain into close, formal ranks, but spreading out above into the most graceful flights and spirals, getting ever thinner and lighter toward the top. These had been first painted on the fabric and were then embroidered with an intermixture of silk and metallic threads and of tiny beads to give them the necessary brilliance.

A similar set of thin curtains, recently executed for a house in Denver, Colorado, showed a design of wild roses, tied together along the borders by knots of pale blue ribbon, — the style suggesting that known in decorative art as the mode of the days of Louis Seize. They were most beautifully executed, the work being alike on the two sides of the fabric.

Among the finest things the atelier has yet turned out are two portières that were not made in answer to an especial order but simply as experiments — as studies in color and in technique, as samples to prove of what the art is capable to-day. Each of these pieces shows within a dark plush border an immense mass of roses rising from a vase. But they differ from one another both in color and in design. The manner of their production may serve as an illustration of the careful, painstaking methods to which I have already referred as so characteristic of Mrs. Wheeler's school, and also of her recognition of the fact that while nature need not be "conventionalized" for the decorator's purpose, it must be artistically adapted and fitted to the medium employed. The roses were studied from life by Mrs. Wheeler while in St. Augustine last spring, copies of fine individual flowers being made with the greatest care both as to form and as to variety and distribution of tint. Then a full-sized painting was made in which these separate studies were combined into a whole fitted for its decorative end. The vases were copied from fine Oriental originals, full-sized water-color studies being given to the workwomen for their guidance. The result is surely two of the finest essays in embroidery that have been made in any day. The background is in each case a pale, yellow-toned heavy silk. In one the vase is in blue, worked in tapestry stitch and giving with wonderful fidelity the texture and tone of the porcelain. The great mass of roses which rises from this is of a deep pink near the vase and shades off in gradual broken harmonies to paler yellow-pinks, and to yellows which melt into the background. On the other curtain the vase is dark green and its different texture — that of a coarser pottery — is given with equal skill. Dark green leaves and heavy dark roses rise from this vase, and these tones are then carried off into ever lighter ones, as in the different scale of the other example. The gorgeous mass almost covers the panel, but breaks and strays into lighter clusters as it rises higher. Nothing, I think, shows Mrs. Wheeler's artistic feeling more plainly than the way in which she thus manages her composition so that, whether it be formal or free, what the French call *pondération* is always secured, so that there is no overloading, no confusion, no disproportion between parallel parts of the subject, so that the masses which are heavier both in color and form are always toward the base of the design.

Nor can too much praise be given to the way in which the splendid roses have been used in these two curtains. The great masses of blossoms are beautifully grouped and drawn and colored, and are worked with extreme delicacy, yet always with an aim to general effect and an avoidance of undue insistence upon detail. They are so managed that an appearance of depth is secured which we rarely find in textile work. Yet the effect of painted work has not been imitated in the least, and though the eye looks deep into the rich mass of color, its primary decorative effect is not at all interfered with.

Another curtain which Mrs. Wheeler has recently completed — and which will probably be shown at the exhibition of American embroidery which she is organizing in connection with the approaching Bartholdi-Statue Loan Collection in New York — shows on a changeable silk of the most delicate bluish-yellow, a design of iris plants. The blossoms are naturalistically treated and the general growth of the plant is not falsified or "conventionalized," but the leaves are displayed in a somewhat formal manner and thus the necessary decorative result is secured. At the base of the curtain the growth is thick and the flowers deep purple in hue, but as the upper portions are approached the pattern becomes more scattered and the blossoms shade off gradually into faint lilacs and yellows.

The materials Mrs. Wheeler uses are always of the finest quality, many of them, as I have said, being made in American looms under her own direction. They will last for centuries, and the threads employed are chosen with equal care as to the substance and dyed with equal skill for the attainment of the desired hues. It may seem at first hearing as though white satin and pale-colored silks were not very practical textures to use in work the aim of which is to be useful and permanent as well as beautiful. But these are only intended, of course, for state apartments where neither dust nor rough usage will afflict them. Mrs. Wheeler has stores of less dainty materials which are quite their equals in beauty. And even in these most delicate ones the material is so carefully chosen, is so fine and smooth and heavy, and the embroidery is so firmly and solidly applied that

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[1] Continued from page 128, No. 403.

dust will shake or brush off them very readily and they may prove, after all, more serviceable than fabrics of darker hue but less perfect texture.

The coming exhibition to which I have just referred will undoubtedly show Mrs. Wheeler's work in many of its different branches, and it is her desire to bring together examples of all the artistic embroidery done in this country after original designs, so that the public will be able to gain a more exact idea than hitherto of what we have accomplished in this branch of decorative art. If Mrs. Wheeler and Miss Townsend show at their best, and if their fellow workers in New York and other cities will send their finest work as well, it is certain that some surprise and much delight will be called forth by the collection; and it is likely we may be led to wish that it might be transported bodily to Paris or to London for exhibition. In neither place, I think, would it find dangerous rivalry; — in no place I am very sure would the local work be found to equal, still less to surpass it, either in excellence and variety of execution or in originality of style. M. G. VAN RENSSELAER.

HUE, THE ANAMESE CAPITAL.

WE are told that the French propose an immediate attack on Hué, the capital of Anam. It will not be easy to succeed, for P'on-thua-thien, as the officials call it, is one of the most formidable fortified towns in Asia. It lies on the Hué River, about six miles from the sea-coast. The river is but small and only navigable for craft of light tonnage. It is no more than four hundred yards wide at its mouth; there is an awkward bar of hard sand, and this is commanded by a strong fort with a regular glacis and ditch, a rampart of stone and lime, and a large number of guns mounted *en barbette*. Outside the bar there is plenty of water, but at this season of the year there is always a heavy surf. Beyond silencing the fort, therefore, the French fleet will be able to render little assistance to the land forces. The attacking body will probably find the river the most convenient way of getting over the six miles between the sea-coast and the town. There is, indeed, a "royal road," but it is a very sorry one. It is cut up by a number of streams and gullies spanned by ruinous bridges, which it would be almost superfluous labor to destroy altogether. Hué is said to contain 100,000 inhabitants; but of these, the vast majority, as is usual in Oriental capitals, dwell without the walls. The interior or walled town is a vast citadel, square in form and measuring about five miles in perimeter. It is built *à la* Vauban, and was constructed by the great Emperor Gia Long, in the beginning of the century, from plans furnished by French engineers. The river flows under its walls on the west and south, and a canal thirty yards wide and four or five feet deep encircles the other two sides. Branches of this canal pass inside and flow round the royal palace, the arsenal, and the granaries so that the tribute from the provinces can be carried straight to the royal storehouses. The enciente is marked by a well-made glacis all round. There is a rampart of hard earth cased on the outside with bricks, a fosse thirty yards broad, and a covert way. Each angle is flanked by four bastions intended to mount thirty-six guns apiece, some of them in embrasures and some *en barbette*. There are four gates on each face, built of solid masonry. Over each of them towers a Chinese pavilion of fantastic form and about seventy feet high. Stone bridges are built over the river and the canal opposite these gateways. Drawbridges do not seem to have figured in the plans furnished to Gia Long by the Frenchmen.

The place looks very imposing from the outside. A row of magnificent trees lines the ramparts and makes a charming promenade; but the view within is very dismal, and the interior looks more like a desert than a capital city. Within the ramparts live the mandarins, the garrison, and the princes of the blood royal. The only other buildings are the public offices, the granaries, the prisons, the arsenal, besides the hovels of the few tradesmen who are allowed to come in to sell tea and tobacco and such like wares to the soldiery. These wretched shanties scarcely add to the general cheerlessness. The paved ways are all grass-grown, and the rest is a waste of uncultivated land. But within these walls there is a second line of defence — a fortress within the fortress. This occupies perhaps a quarter of the whole area. It is also quadrangular, and is the citadel properly so-called; it is styled the Thang-noï. Like the outer walls, it has its ramparts and bastions, mounted at every available point with guns, and, if resolutely defended, would be much harder to take than the gigantic outer works. Inside this is the Imperial Palace out of which his late Majesty hardly ever stirred. It is distinguished from afar by its yellow roof, that being the Anamese royal color. The princes of the blood daub their palaces red. In the Thang-noï his Majesty lives with his queens, and none but the guards and those employed in the royal service are allowed to enter it. If an artificer has displayed sufficient skill to be called in to execute repairs in the palace, he is detained there as a prisoner for life. By the side of the palace stands a temple consecrated to the ancestors of the Emperor; and there he performs what worship seems to him consistent with his magnificence. A curious rule — Oriental or un-Oriental, according to the point of view in which you regard it — provides that any woman, of whatever rank, may enter the Thang-noï unquestioned, as long as she is fairly good-looking.

The granaries of Hué within the ramparts are one of the chief sights of the place. They stretch over an enormous area, and two or three fresh buildings are added every year, as the tribute comes in from the provinces. They contain supplies sufficient to support fifty thousand men for a dozen years. The treasury is a building of which wonderful stories are told. It is a vast reservoir or tank, with high blank walls and only one opening — a window high up in the side toward the palace. Through this window is thrown annually — so the tale goes — a log of wood hollowed out and stuffed with ingots of gold and rouleaus of money. What goes in never comes out again. No wonder the French want to possess themselves of Hué. The guardians that watch over this fabulous treasure are vigilant and incorruptible. They are crocodiles.

The arsenal of Hué is as vast as the granaries. In 1828 when Dr. Crawfurd went there as ambassador from the Governor-General of India, he saw in this arsenal a great number of old ship-guns — English, French, Dutch and Portuguese. But there were also whole parks of brass ordnance made in Cochin-China from metal dug in Tong-king mines. The models were French guns and they were mostly howitzers and mortars. Crawfurd saw nine 93-pounders with Gia Long's name cast on them. The gun-carriages were neatly painted and contrary to Oriental habit the guns themselves were kept in good working order. This statement is borne out by the letters of many missionaries in the "Annales de Propagation de la Foi," one enthusiastic father declaring that the pieces were so highly polished that they shone in the sun like silver. Whether the Anamese gunners are able to work their guns as well as keep them in order remains to be seen. They are not wanting in pluck; in fact a great part of the Anamese soldier's drill consists in tests of his courage.

Hué is undoubtedly a place that may offer a stout resistance but it has many weak points. The chief of these is its vast size. At least fifty thousand men are required to garrison it. That number will be forthcoming without doubt; but they may not be able to resist a concentrated attack. The height of the ramparts is another source of danger. Modern field artillery would probably be sufficient to batter them down notwithstanding their enormous thickness; and the débris would serve to fill the ditch and so remove another difficulty. Finally it is almost certain that the Anamese will be unable to find sufficient men capable of working the eight hundred guns mounted round the fortress. Their great ally at this season of the year is the unhealthiness of the climate. If a prolonged resistance can be offered it is not unlikely that the French will have to retire baffled. Indeed it seems probable that the sudden resolve to attack Hué is prompted as much by a desire to combat disease by active operations as by a notion that the fall of the capital will terminate the war. — *St. James's Gazette.*

CATCH-WATER RESERVOIRS.

AS artificial storage of rain-water for summer use is of the greatest importance in many rural districts where wells and springs are not found, a few remarks on the construction of reservoirs may be of service. The amount of rainfall can only be determined by the measurement of the drainage area comprised within the watershed lines, though this area cannot always be relied upon, as when an impervious stratum underlies a porous soil. Various geological features may alter the quantity of water, such as the nature of the soil, its porosity, the inclination of the ground, and other causes; and it is necessary, therefore, before deciding upon a site for a reservoir, to survey the gathering-ground, the underlying soil, and other natural features. It is the available rainfall only that can be estimated, or

that portion of the total rainfall of the district that can be stored. The losses by evaporation, absorption by soil and plants, must be taken into the account. Having obtained the amount of annual rainfall of the district, certain deductions have to be made. One authority states that upon average drainage areas the available quantity may be taken at fifty per cent of the total annual rainfall. Taking the average fall of thirty-two inches per annum, an available rainfall of 15 or 16 inches may be depended upon. In districts where the rainfall is great, as in Lancashire, the reservoir need not be made so large as in the eastern parts of England. The most economical site for a reservoir, other things being favorable, is that of a natural valley, where, at a small cost, an embankment may be formed across at one end; but even such a position may be disadvantageous compared with one in which an impermeable clay soil is found. Such a soil saves the cost of puddling, while the more naturally suitable position, as regards form, may allow of only a small proportion of the rainfall being stored for use. It would be a mistake also to select a site so distant from the place of consumption as to require a great length of pipes, as in such a case the object of a reservoir for storage is defeated. Wherever a natural depression exists, a little excavation may be sufficient to form a reservoir; but on level ground the cost of construction, raising dams and puddling may be out of proportion to the advantages to be derived. It is generally possible, however, to form the reservoir by a partial excavation, the material being thrown up to raise the sides or embankments, and thus the cost of embanking the whole depth all round may be considerably reduced. Concrete is now largely employed for underground tanks and embankments, and for small reservoirs is admirably adapted. It may be made of common lime properly slaked and mixed with sand, the face cemented with Portland cement half an inch thick.

With regard to capacity, it is much better to increase the depth than the surface. A large surface of water presents more for the action of evaporation, and water so exposed is more likely to become deteriorated; nearly vertical sides are preferred, and a covering is an advantage, though the cost of it often precludes its adoption. One writer observes that silicious sandstones, hard-burnt bricks, bedded in powerfully hydraulic limes or cements, are the most advisable materials to be used in forming the faces in contact with the water. In constructing the dams of reservoirs upon soils of a doubtful nature, all loose material should be removed. A puddle wall or core, made of tough impervious clay, is necessary, and this should be sunk into a trench which is excavated for it. The puddle wall is carried up to top of reservoir, and is made to batter at the sides. Its width at the base is generally about one-third the depth of water to be sustained. These puddle walls are supported by banks composed of a retentive material, selected with care, and resting on puddle seating very carefully formed, while the outer banks are made to slopes of three and four to one, with harder material, protected by stone pitching on the inner slope. There is a kind of excavating scoop now made which greatly facilitates the construction of reservoirs. The scoop is worked by drawing it backward and forward between two steam plowing engines. Any area can be scooped out, the depth being according to the number of times the ploughing and scooping operations are performed.—*The Building News.*

THE VENTILATION OF PUBLIC BUILDINGS.

Philadelphia, September 13, 1883.

To the Editors of the American Architect:—

Dear Sirs,—Would you kindly inform me, if you can spare time and space in your valuable paper, what is the best treatise on the approved methods of ventilation, especially for public buildings. By doing so you would greatly oblige, Yours, etc., S. C.

[The most recent treatise on the subject is the "Ventilation of Public Buildings," by Robert Briggs, C. E., published in the *Journal of the Franklin Institute*; it has also probably been published in separate form by some Philadelphia publisher. Dr. John S. Billings, U. S. A., is the author of a lengthy series of articles on heating and ventilation which have been published during the past two years in the *Sanitary Engineer.*—Eds. American Architect.]

ARCHITECTURAL SCHOOLS.

Kansas City, Mo., September 7, 1883.

To the Editors of the American Architect:—

Gentlemen,—Can you inform me as to the architectural schools in Boston, New York and Chicago, their terms of admission, etc. I understand tuition to be free in New York. I have a son who wants to pursue architectural studies.

Yours truly, H. L. Johnson.

Leavenworth, Kan., September, 1883.

To the Editors of the American Architect:—

Dear Sirs,—Please inform me of some good architectural schools or colleges, and to whom I must address for a catalogue or information. Are there any good ones in Illinois or Missouri? Also, please tell me the best course for a student who cannot attend school, to be a good draughtsman I have been at work in an architect's office nearly two years, and would like to attend an architectural school if possible. Hoping to receive an answer, I am,

Yours respectfully, William P. Feth.

[The principal architectural schools in this country, so far as we know, are the Architectural Departments of the School of Mines in Columbia College, New York City, Cornell University, at Ithaca, N. Y., the Illinois Industrial University, at Champaign, Illinois, and the Massachusetts Institute of Technology, at Boston. The College of the City of New York, Princeton College in New Jersey, and the Michigan State University, at Ann Arbor, at one time, we think, maintained architectural departments, and one college in Georgia, and another in the far Northwest, have recently established similar ones. The requisites for admission and the terms of tuition probably vary considerably, but can be ascertained by communicating with the Secretaries of the respective institutions.—Eds. American Architect.]

WROUGHT-IRON CHIMNEY-SHAFTS.

London, England, September 4, 1883.
501 Caledonian Road, Holloway.

To the Editors of the American Architect:—

Sirs,—Will you kindly allow me to ask through your paper, whether many wrought-iron chimneys have been erected in America or Canada, and if so, how they answer? Do they require many repairs, and compared with brick or stone chimney-shafts are they cheaper?

I should also like to ask if some of your correspondents will please give the name and dimensions of some half-dozen of the tallest chimneys built in America or Canada.

Yours respectfully, R. M. Bancroft.

[As we sometimes feel that we discourage others from contributing their mite for the common benefit, we refrain from answering this question at present.—Eds. American Architect.]

NOTES AND CLIPPINGS.

Testing Fortifications with an Eighty-ton Gun.—An experiment, with the object of testing the effect of the fire of the eighty-ton gun on fortifications, was carried out on August 22 at Shoeburyness. A representation of one of the most impregnable forts at Spithead, sixty feet long by twenty feet wide, has been built up on the Marshes and divided into four sections, the whole constructed of blocks of granite, with backing of teak and concrete. In front of the two inner sections two iron targets, each nine inches thick, separated by a layer of teak, were placed, and it was against one of these that yesterday's first experiment was carried out. The gun, on an experimental carriage, was placed in position on a line of rails, at about two hundred yards from the target, and the preliminary operations were commenced. The gun was loaded with 450 pounds of pebble powder and a shot weighing 1,700 pounds, including gas check. The gun was fired by electricity, and following the discharge came the crash on the target. Examination showed that the projectile, with an initial velocity of 15.88, struck the target exactly in the centre, cut through both iron slabs and facings of granite, and was embedded about six feet in concrete behind. The result of the experiment appeared to give great satisfaction. This representation of a fort has cost some thousands of pounds.—*London Standard.*

The Bartholdi Statue.—The following from the Boston *Herald* may be of interest in connection with the paper on the Statue of Liberty to be found elsewhere in this issue. "For the past fortnight there has been an unusual activity on Bedloe's Island caused by a number of workmen who are excavating a foundation for the pedestal of the Bartholdi Statue. This foundation, which occupies a space of about one hundred feet, lies in that part of the island which is generally known as the parade. The excavators have already reached a depth of sixteen feet. The concrete, which is to be used for the base of the pedestal, is composed of trap rock, which is broken near Weehawken and brought to the island from the Palisades. American cement will be used, and it is calculated that two hundred cubic yards will be placed each day. The workmen will be quartered on the island. For carrying the material, a trestle of heavy timber has been constructed. Mr. Francis H. Smith, the constructing engineer employed on the work, said to a reporter yesterday; 'As this work must be finished as quickly as possible, we have formed a plan to have steam elevators at the end of the trestle, and then to unload the boats by dump tubs into a railroad car, which will descend by its own gravity about six hundred feet over the high parapet wall of the fort and into the excavation. On the opposite side of the island there will be another trestle five hundred and fifty feet long, piled out through the shoal water till it reaches a depth of six feet. All the cement, of which about 18,000 barrels will be required, will be landed over this trestle. A steam pump has been set up on the shore, in order to force over the parapet of the fort the water that will be used in mixing the concrete. Salt water will be entirely employed for that purpose. The concrete base, together with the masonry, will weigh about 48,000 tons. This is exclusive of the weight of the statue, which is 180 tons. The entire statue is 126 feet in length, and the pedestal is 159 feet high from high water. In order to obviate any danger of lightning, we have five iron tables, three inches in diameter, running through the entire base of the pedestal and foundation into the earth and inclosing in the middle a copper wire. We will begin work at the concrete next Monday. The height of the concrete portion of the pedestal will be 48 feet, while that of the granite portion will be 112 feet. We hope to have the work finished on the 15th of November. This will be the largest quantity of concrete that has been laid together in one mass in this country. So far as my experience has gone, concrete, when mixed in due proportions, has never yet failed to answer all reasonable demands made upon it. Masonry would undoubtedly have been preferable, but the cost would have been much greater. The chief employment of the men will be to mix the concrete.'"

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

284,588. Window-Screen.— William G. Anderson, Boston, Mass.

284,598. Wrench. — Carl A. Blomquist and Theodore Buskirk, Toledo, O.

284,602. Weather-Strip. — Martin L. Bramhall, La Porte, Ind.

284,627. Fire-Escape. — Hiram E. Goble, Kalamazoo, Mich.

284,653. Compound for Preserving Wood and Metal. — Lorenzo D. Mott, Jr., Marshalltown, Io.

284,654. Alarm for Elevators. — Amos Nickerson, Somerville, Mass.

284,666. Pen-Beam Standard for Ruling-Machines. — Edwin J. Piper, Springfield, Mass.

284,683. Fire-Escape. — Charles H. Tweed, Allegheny, Pa.

284,722, Shutter-Worker. — Hiram M. Chamberlin, Reading, Vt.

284,725. Compound for Roofing Buildings. — Wm. Detrick, Indianapolis, Ind.

284,732. Bench-Plane. — Arthur T. Goldsborough, Washington, D. C.

284,739. Saw-Handle.— Harrison P. Hood, Indianapolis, Ind.

284,740. Fire-Escape.— William H. Isley, Jersey City, N. J.

284,747. Floor-Clamp. — Henry D. Margot, Mountain View, Cal.

284,761. Apparatus for Ventilating Sewers and Drains. — Thomas Rowan, London, Eng.

284,763. Fire-Escape. — Michael Scholl, San Francisco, Cal.

284,808. Fire-Escape. — E. Herman Brown, Baltimore, Md.

284,824. Straining-Beam. — Benjamin F. Davis, Dallas, Tex.

284,845. Scaffold-Bracket. — Amos D. Hart, Elmira, N. Y.

284,871. Fire-Escape. — Charles Maliphant, New Brighton, N. Y.

284,872. Awning. — Frank B. Mallory, New York, N. Y.

284,873. Portable Trestle. — Wesley F. Marsh, North Platte, Neb.

284,878. Electrical Annunciator. — David A. McCormick, Detroit, Mich.

284,882. Awning. — Joseph Moynan, Brooklyn, N. Y.

284,893. Door-Knob Attachment. — Edward L. Phipps, Milford, Mich.

284,895. Apparatus Employed in Sinking Pits or Shafts. — Ildephonse Quinet and Arthur Denis, Denain, France.

284,919. Bench-Plane. — William Steers, Sherbrooke, Quebec, Can.

284,941. Rabbet-Plane.— John M. Bennett, Green Island, N. Y.

284,944. Wood-Cutter. — John Burge, Westfield, Mass.

284,961. Door-Bolt. — William S. Hill, Cutler, Ill.

284,963. Vault or Combination Skylight Reflector Roof. — Thaddeus Hyatt, New York, N. Y.

284,976. Latrine and Water-Closet. — Walter E. Parfitt, Brooklyn, N. Y.

284,980. Burglar-Alarm. — William H. Reiff, Philadelphia, Pa.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Since our last report twenty-two permits have been granted, the more important of which are the following:—

Mrs. M. Koenig, two-st'y brick stable, in rear of No. 203, s s Orleans St., bet. Bond and Bethel Sts.

L. H. Robinson, 7 three-st'y brick buildings, e s Fulton Ave., com. n e cor. Lanvale St.; and 7 two-st'y brick buildings, e s Fremont St., s of Sewell St.; and 7 two-st'y brick buildings, w s Argyle Ave., s of Sewell St.; and a two-st'y brick building in rear of e s Bruce Alley, s of Lanvale St.

Benj. Howard, two-st'y brick stable, in rear n w cor. John and McMechen Sts.

Geo. A. Von Lingen, 2 three-st'y brick buildings s s Baltimore St., bet. High and Exeter Sts.

Charles H. Nickelman, 4 three-st'y brick buildings, w s Patterson Park Ave., bet. Pratt and Gough Sts.; and 5 two-st'y brick buildings, e s Madeira Alley, bet. Pratt and Gough Sts., in rear of above.

Wm. J. E. Diven, 5 two-st'y brick buildings, e s Gilmor St., bet. Baker and Presstman Sts.

J. M. Cone, 10 two-st'y brick buildings, e s Schroeder St., bet. Edmondson and Harlem Aves.

Emil Hershman, three-st'y brick building, s w cor. Pratt and Caroline St.

H. D. A. Henning, three-st'y brick building, n s Hollins St., w of Monroe St.

Hogg & Brown, 5 three-st'y brick buildings, n s Lexington St., bet. Pine and Chatsworth Sts.

Boston.

Building Permits. — *Brick.* — *Commonwealth Ave., No.* 267, Ward 11, for Winthrop Sargent, dwell., 26′ x 6[illegible]′, five-st'y flat.

Commonwealth Ave., Nos. 209 *and* 211, Ward 11, for W. Powell Mason, dwell., 50′ x 52′, three-st'y flat; Geo. G. Nichols, builder.

Washington St., Nos. 409-417, Ward 17, for Est. Barney Corey, apartment-house, 76′ x 76′, five-st'y flat; J. J. McNutt, builder.

Wood. — *Boylston Ave.*, near Porter St., Ward 20, for Henry Dickhaut, 2 dwells., 22′ 6″ x 36′; R. D. Ward & Co., builders.

Dunstable St., cor. Williams St., Ward 5, for Wm. P. Winchester Estate, manufactory, 50′ x 100′, four-st'y flat.

Lake St., near Kendrick St., Ward 25, for Massachusetts Society for Prevention of Cruelty to Animals, sheltering home, 33′ 6″ x 57′, two-st'y pitch; Conley & Co., builders.

Perrin St., rear, cor. Waverly St., Ward 21, for Francis N. White, stable, 1[illegible]′ x 32′ and 32′ x 44′, one-st'y hip; Amos D. Gould, builder.

Pratt St., near Linden St., Ward 25, for Isaac Pratt, Jr., dwell., 20′ and 26′ x 30′, two-st'y pitch; W. B. Cameron, builder.

Centre St., cor. Centre Pl., Ward 23, for Wm. C. Starbuck, dwell., 33′ x 36′, two-st'y pitch; Chas. G. Lynch, builder.

Templeton St., near Adams St., Ward 24, for Eugene D. Brooks, dwell., 15′ x 15′ and 20′ x 30′, two-st'y pitch; Geo. Driscoll, builder.

Albany St, rear, near Chester Park, Ward 20, for E. A. Rimick, stable, 22′ x 50′, one-st'y pitch.

Shelton St., near Adams St. Ward 24, for Dennis B. Flynn, dwell., 22′ x 29′, two-st'y pitch.

Wyoming St., near Warren St., Ward 21, for Samuel M. Shapleigh, 2 dwells., 18′ x 20′ and 23′ x 34′, two-st'y pitch; Samuel M. Shapleigh, builder.

Templeton St., near Adams St., Ward 24, for Eugene D. Brooks, 2 dwells., 14′ x 15′ and 14′ x 30′, two-st'y pitch; Geo. Driscoll, builder.

Savin Hill Ave., cor. Sagamore St., Ward 24, for G. R. Richards, dwell., 23′ x 34′, two-st'y pitch; McDonald & Tobin, builders.

Highland St., near High St., Ward 24, for Samuel H. Buck, carriage-house, 25′ x 35′, one-st'y pitch.

George St., cor. Hampden St., Ward 20, for E. S. Hoffman, bakery, 26′ and 34′ x 47′ and 69′, one-st'y flat; Lord & Young, builders.

Spectacle Island, Ward 2, for N. Ward & Co., glue manufactory, 10′ 9″ x 55′ 6″ and 20′ x 20′, two-st'y pitch; Christopher Tilden, Jr., builder.

East Fifth St., near Pickering St., Ward 14, for Lyman Lock, 4 dwells., 13′ x 19′ and 20′ x 32′, two-st'y flat; Lyman Lock, builder.

East Sixth St., near K St., Ward 14, for M. E. Evans, dwell., 22′ x 32′ and 18′ x 25′ 5″, two-st'y mansard; James O. Evans, builder.

Brooklyn.

Building Permits. — *Johnson St., Nos.* 70-74, s s, 34′ w Jay St., 3 four-st'y brick tenements, tin roofs: cost, each, $4,000; owner and builder, Wm. Gorden, 76 Johnson St.; mason, J. Magee.

Ross St., No. 86, s s, 189′ e Wythe Ave., two-st'y and basement brick tenement, felt, cement, and gravel roof; cost, $5,500; owner, Jno. Given, 95 Milton St.; architect, H. E. O'Neil; builder, M. Smith.

Grand Ave., s e cor. Clifton Pl., three-st'y brick store tenement, felt and gravel roof; cost, $3,500; owner and builder, E. L. Donnellon, President St., near Henry St.; architect, R. Dixon.

Van Brunt St., No. 147, e s, 95′ s Union St., four-st'y brick stores and tenement, tin roof; cost, $9,000; owner Edward Sheridan, 180 Fourteenth St.; architect, P. Leibbrand; builders, P. Kelly & Son, and Gibson & Leibbrand.

Fayette St., Nos. 25 *and* 27, n s, 2 three-st'y frame tenements, tin roofs; cost, each, $3,000; owner, S. Sheffel, 10 Thornton St.; architect, T. Engelhardt; builders, M. Kuhn and M. Schmidt.

Cook St., Nos. 7 *and* 9, n s, 75′ e Ewen St., three-st'y frame storage building, tin roof; cost, $2,500; owners, Fraas & Son, on premises; architect, T. Engelhardt.

Ellery St., No. 231, s s, 200′ e Throop Ave., three-st'y frame double tenement, tin roof; cost; $4,200; owner, R. Waldeman, 810 Flushing Ave.; architect, T. Engelhardt; builders, J. Rauth and J. Rueger.

Park St., Nos. 21 *and* 23, about 200′ e Broadway, three-st'y frame store and double tenement, tin roofs; cost, each, $4,200; owner and builder, George Straub, 704 Broadway; architect, T. Engelhardt.

Bushwick Ave., w s, 60′ n Duryea St., two-st'y and basement brownstone front dwell., tin roof; cost, $6,000; owner, R. E. McCafferty, 930 Gates Ave.; architect, F. Weber; builders, M. J. Reynolds & Son and McKee Bros.

Floyd St., No. 104, s s, 225′ e Marcy Ave., three-st'y frame tenement, tin roof; cost, $3,500; owner, Jacob Ludwig, 106 Floyd St.; architect, T. Engelhardt.

Myrtle Ave., s s, 200′ e Throop Ave., 6 three-st'y brownstone front tenements, tin roofs; cost, total, $42,000; owner, D. R. James, 951 Myrtle Ave.; architect, A. F. D'Oench.

Seventh Ave., s e cor. Carroll St., 8 three-st'y and basement brownstone front dwells., tin roofs; cost, each, $7,500; owner, Henry Lansdell, Ninth St., cor. Seventh Ave.; architect, C. B. Sheldon; mason, J. M. Brown.

Jefferson St., w s, 310′ e Marcy Ave., 3 three-st'y and basement brick dwells., tin roofs, iron cornices; cost, each, $9,000; owner and builder, Geo. H. Stone, 301 Jefferson St.; architect, G. A. Schellenger.

Fourteenth St., s s, 357′ 10″ w Fourth Ave., 2 three-st'y frame tenements, tin, or gravel and felt roofs; cost, each, $3,000; owner and architect, F. L. Corwin; builder, J. H. Herbert.

Elizabeth St., No. 167, s s, 175′ e Conover St., three-st'y brick tenement, tin roof; cost, $3,900; owner. Wm. Gilbride, 347 Van Brunt St.; architect, J. J. Kelly; builders, P. Kelly & Son.

Central Ave., Nos. 95-99, e s, 25′ n Troutman St., 2 three-st'y brick double tenements and three-st'y brick store and double tenement, tin roofs; cost, each, $5,000; owner, Leob Eppig, 58 Central Ave.; architect, G. Hillenbrand.

Park Ave., n s, 50′ w Kent Ave., 2 four-st'y brick stores and tenements, tin roofs; cost, each, $6,000; owner, A. Phillips, 225 East One Hundred and Twenty-fifth St., New York city; architect, S. B. Vreeland.

Alterations. — *Elm Pl., Nos.* 10 *and* 12, one-st'y brick extension, peak roof tinned, cost, $8,000; owner, George Zipp, on premises; architect, C. D. Eisenach.

Sidney Pl., No. 52, three-st'y brick extension on rear, tin roof; cost, $4,500; owner, Mary L. Miner, on premises; architects, Parfitt Bros.

Chicago.

Church. — J. H. Huber is architect for the German Baptist Church, to be built on Willow St.; cost, $10,000.

Houses. — Martin McNulty will build 5 three-st'y dwells., with store below on Rush St.; cost, $20,000; Lehman & Co. are the builders.

C. B. Holmes is architect for three-st'y dwell. on Prairie Ave.; cost, $15,000.

H. R. Wilson is architect of 3 three-st'y dwells. on Adams St., for Wm. Regan; cost, $12,000; builders, Geo. Lehman & Co.

C. P. Thomas, architect, made the plans for 4 two-st'y dwells., for Miss M. Kelly, to be built on Centre Ave., at cost of $12,000; H. Himard, builder.

D. McCarthy will build two-st'y dwell. on Oak St.; cost, $9,000; the architects are Fromman & Jepsen; builder, D. Wrenn.

Burnham & Root are architects for two-st'y dwell. on Washington Boulevard, for H. A. Christie, to cost $7,000; the builders are J. M. Dunphy & Co.

F. L. Charnley, architect, made the plans for 4 two-st'y dwells., with stores underneath, for S. P. Parmly on West Van Buren St.; cost, $10,000.

P. Humiston is building 3 three-st'y dwells., with stores below on West Lake St.; cost, $12.000; planned by O. H. Placey, architect.

The same architect planned three-st'y dwell. and store on Western Ave., for M. G. Collson; cost, $6,000; Oliver & Hill, builders.

H. Kley, architect, made plans for three-st'y dwell. on Rumsey St., for Dreffein Bros.; cost, $6,000.

John Otto, architect, has completed plans for two-st'y dwell. on Sedgwick St., for Albert Ness; cost, $6,000.

The same architects planned three-st'y dwell. and store, for G. Kennally on Milton Ave.; cost, $5,000.

Burling & Whitehouse are architects for 2 three-st'y dwells. and stores to be built on Indiana and Hoyne Sts., for H. J. Winslow, to cost $12,000; the builders are J. M. Dunphy & Co.

There will be erected on Wabash Ave. a block of 16 three-st'y dwells., for E. B. Hosmer, Son & Keeney, to cost $136,000; the architect is Wm. Thomas; Geo. Lehman & Co. are the builders.

Store and Flats. — Furst & Rudolph, architects, planned the store and flats to be built on Archer Ave., for D. E. Healy; cost, $12,000.

Stores. — F. L. Charnley is architect for the 2 stores on Third Ave., being built for L. G. Fisher, to cost $10,000.

Warehouses. — Burling & Whitehouse, architects, planned the four-st'y warehouse building, cor. of Fulton and Clinton Sts., for the National Warehouse Co.; cost, $30,000.

Mr. Huntington will build a five-st'y warehouse on North Water St., to cost $25,000.

Building Permits. — Miss M. Kelly, 4 two-st'y dwells., 318-322 Centre Ave.; cost, $12,000; architect, P. Thomas; builder, H. Himard.

D. McCarthy, two-st'y dwell., 174 Oak St.; cost, $9,000; architects, Frommen & Jepsen; builder, D. Wrenn.

Chas. Willoughby, two-st'y barn, 11-13 Eldredge St.; cost, $3,000.

Martin McNulty, 5 three-st'y stores and dwells., 18-26 Rush St.; cost, $20,000; builders, Lehman & Co.

Wm. Recker, two-st'y dwell., 352 Twenty-second St.; cost, $3,000.

M. Small, two-st'y livery stable, 490-92 Van Buren St.; cost, $8,000; architect and builder, G. Heuston.

Jno. Tierney, cottage, Nineteenth and Johnson Sts.; cost, $2,600.

M. Skala, three-st'y store and dwell., 165 West Twelfth St.; cost, $7,000.

John Messerer, two-st'y dwell., 126 Ambrose St.; cost, $3,000.

Catherine Figo, two-st'y dwell., 587 Holt St.; cost, $3,000.

Indiana Club, bowling alley, 3349 Indiana Ave.; cost, $2,900.

H. A. Christie, two-st'y dwell., 755-757 Washington Boulevard; cost, $7,000; architects, Burnham & Root; builders, J. M. Dunphy & Co.

J. S. Jones, two-st'y dwell., 928 Jackson St.; cost, $3,000; architect, Thomas.

E. D. Landis, two-st'y dwell., 175 Howe St.; cost, $4,000.

John Workmeisler, two-st'y dwell., 3200 Vernon St.; cost, $6,000.

Wm. Rogan, 3 three-st'y dwells., 689-691 Adams St.; cost, $12,000; architect, H. R. Wilson; builders, Geo. Lehman & Co.

Fred. Malcolm, two-st'y and basement store and dwell., 736 Clybourne Ave.; cost, $6,000.

C. B. Holmes, three-st'y dwell., Prairie Ave. and Thirtieth Sts.; cost, $15,000; architect, C. B. Holmes; builder, A. B. Cooke.

F. L. Wilson, two-st'y dwell., 128 Fourth Ave.; cost, $2,800.

Mr. Huntington, five-st'y warehouse, 169 North Water St.; cost, $25,000.

C. & N. W. R. R. Co., freight-house, West Water and Dunn Sts.; cost, $15,000.

M. Burbach, two-st'y dwell., 2803 Fifth Ave.; cost, $3,500.

H. J. Winslow, 2 three-st'y stores and dwells., Indiana and Hoyne Sts.; cost, $12,000; architects, Burling & Whitehouse; builders, J. M. Dunphy & Co.

Sarah B. Turner, two-st'y dwell., near Rush St.; cost, $3,000.

National Warehouse Co., four-st'y warehouse,

Fulton and Clinton Sts.; cost, $30,000; architects, Burling & Whitehouse.

S. Tragorth, two-st'y dwell., 187 Wesson St.; cost, $5,500; architect, A. G. Halberg.

F. Heiden, two-st'y flats, 463 Dayton St.; cost, $5,000; builder, Peter Ott.

P. A. Thompson, 2 two-st'y dwells., 815-817 Tallman St.; cost, $3,000.

Sedgwick St. Chapel, one-st'y chapel, 388-390 Sedgwick St.; cost, $6,000.

E. B. Hosmer, Son & Keeney, 16 three-st'y dwells., 2412-2444 Wabash Ave.; cost, $136,000; architect, Wm. Thomas; builders, Geo. Lehman & Co.

H. Zimmermann, two-st'y flats, 504 North Ashland Ave.; cost, $3,000.

D. E. Healy, three-st'y store and flats, Archer Ave. and Fuller St.; cost, $12,000; architects, Furst & Rudolph.

German Baptist Church, -church building, 65-67 Willow St.; cost, $10,000; architect, J. H. Huber; builders, D. Lane & Co.

Cincinnati.

STABLE. — Mr. Geo. W. Rapp, architect, has prepared plans for the Gerke Brewing Co.'s brick stable, three-st'y and basement, 50′ x 85′, on Court St., near Plum St.; cost, $15,000.

STOREHOUSE. — The Herancourt Brewing Co. is building a storage-house, 46′ x 140′, four-st'y high; cost, $65,000; Geo. W. Rapp, architect.

HOUSES. — For H. Enneking, 3 brick dwells. on Myrtle Ave., each to be 28′ x 55′, and three-st'y high; cost, $18,000; Geo. W. Rapp, architect.

BUILDING PERMITS.— V. Moser, two-st'y brick dwell., Bates Ave.; cost, $2,800.

E. A. Townly, 2 three-st'y brick dwells., Mansfield St., near Liberty St.; cost, $12,000.

J. Molloy, two-st'y brick dwell., Clark St., near Baymiller St.; cost, $4,000.

Mrs. Renisager, two-st'y brick dwell., Milton St., near Sycamore St.; cost, $3,000.

Herman Kune, two-st'y brick dwell., Milton St.; near Sycamore St.; cost, $4,000.

John B. Hyatt, three-st'y brick building, Summit Ave., Price Hill; cost, $7,000.

Christ. Ahrens, two-st'y brick dwell.; cost, $5,000.

J. H. Turrell, two-st'y brick dwell., Chase Ave.; cost, $5,000.

Denver, Col.

DWELLINGS. — Miss Mary Thomas, two-st'y brick dwell., 28′ x 42′, Grant Ave.; cost, $8,000; Mr. Nichols, architect.

Henry Collins, 8 two-st'y brick tenements; cost, $13,000.

A. C. Rumble, two-st'y brick dwell., 35′ x 57′, Penn St.; cost, $8,000.

D. C. Roberts, 2 two-st'y brick dwells., Waverly St.; cost, $9,000.

Carlos Gove, three-st'y brick double dwell., 40′ x 49′, Stout St.; cost, $8,000.

L. J. Laws, two st'y brick dwell., 34′ x 60′, Grant Ave.; cost, $8,000.

R. C. Pierce, two-st'y brick dwell., 23′ x 55′, Lincoln St.; cost, $4,000.

STORES. — Wm. Meikle, one-st'y stores, 50′ x 125′, Champa St.; cost, $6,000.

John Dixon, 2 two-st'y stores, 50′ x 75′, Champa St.; cost, $10,000.

STREET RAILWAY DEPOT. — Four-st'y brick stable and depot, 100′ x 125′; cost, $50,000; J. W. Roberts, architect.

RE DIVIVIS REDUCTION WORKS. — Brick building, 80′ x 100′, Blake St.; cost, $30,000.

REPAIRS to residence of T. M. Patterson, Welton St.; cost, $6,000; R. S. Roeschlaub, architect.

Grand Rapids, Mich.

CHURCHES. — The Westminster Presbyterian Church Society have commenced the erection of their church, cor. of Island and Lagrave Sts.; cost, $20,000; D. S. Hopkins, architect.

Ground has been broken for the enlargement of the Chapel of the Good Shepherd, cor. of College Ave. and Bridge St.; cost, $3,000.

SCHOOL-HOUSE. — The Society of St. James Catholic Church intend shortly to erect a large brick parochial school, West Bridge St., cor. Michigan St.; cost, $10,000.

STORES. — Mr. Henry Spring is about to build a brick block, two-st'y and basement, 40′ x 164′; cost, $10,000.

Mr. P. Steketee & Sons are excavating for a new wholesale block on Fountain St.; cost, $10,000.

Mr. John Delancy is building a two-st'y block at West Bridge St., to cost about $8,000.

Hon. Thomas Gilbert has begun a new block at the cor. of Louis and Ottawa Sts., 66′ x 132′; cost, about $15,000.

Mr. H. S. Pressburg has begun a large building on the cor. of East and Logan Sts.

Mr. D. H. Waters is preparing to build a finer block than any now in the city, on the cor. of Ottawa and Pearl Sts.; probable cost, $100,000.

HOUSES. — Walter E. Withy is building a dwell. on Union St.; cost, $10,000.

Mr. H. B. Fairchild and Mr. H. B. Crookston are each building houses on s s Wealthy Ave., costing $2,000 each.

Mr. Lester Wilcox is preparing to build a dwell. on Third Ave., to cost $2,500.

Mr. James L. Wheeler is to build a house on North Prospect St.; cost, $3,000.

Mr. Jno. Smittzler is preparing to build a house, cor. of Lyon St.; cost, $3,000.

Mr. L. Buss is building a house on Summit-street Hill, at a cost of $3,000.

Dr. Williams is building a house on South Division St.; cost, about $2,000.

Mr. R. Van Ness is about to build a cottage on Wealthy Ave., costing $2,000.

Mrs. Eliza Walbridge is building a small cottage on Paris Ave.; cost, $1,500.

Mr. D. S. Hopkins is building a cottage on Paris Ave., costing $2,500.

Mr. James Holt is building a colonial cottage, costing $2,000, on Paris Ave.

The building boom has excelled all expectations. The prospect of cold weather is cooling the building ardor somewhat.

New York.

HALL. — The Young Men's Christian Association of Harlem proposes to erect a building on One Hundred and Twenty-fifth St., between Fifth and Sixth Aves.

HOUSES. — Six three-st'y and basement brownstone front houses, 17′ x 55′ each, are to be built on the s w cor. of Lexington Ave. and Seventy-sixth St., for Mr. Patrick McQuade, at an estimated cost of $100,000; Messrs. Thom & Wilson, architects.

BUILDING PERMITS. — *Centre St., No.* 58, six-st'y brick warehouse, tin roof; cost, $16,000; owner, Edward B. Swift, 115 Lee Ave., Brooklyn; builders, J. & L. Weber.

East One Hundred and Twelfth St. No. 336, one-st'y brick stable, gravel roof; cost, $2,000; owner, Ratje Bunke, 319 e One Hundred and Eleventh St.; architects and builders, Wm. Fernschild & Son.

One Hundred and Twenty-third St., s s, Eighth and St. Nicholas Aves., nine-st'y brick flat, fireproof roof; cost, $532,875; owner, H. Josephine Wilson, 157 e Seventy-second St.; architect, D. E. Atwood.

One Hundred and Ninth St., n s, 225′ e Second Ave., five-st'y brick tenement, tin roof; cost, $16,500; owner, Emil Haenschen, 116 e One Hundred and Seventeenth St.; architect, John Brandt.

West Seventeenth St. No. 331, five-st'y brick tenement, tin roof; cost, $10,000; owner, Jas. H. Butler, 225 Garden St., Hoboken; architect, Bart Wather.

Greenwich St. Nos. 490 *to* 506, six-st'y brick warehouse, tin roof; cost, $78,000; owner, Ambrose K. Ely, 103 Gold St.; architect, John McIntyre; builders, Robinson & Wallace and Wm. J. O'Connor.

Third Ave., w s, 25′ n One Hundred and Fifty-sixth St., three-st'y frame tenement and store, tin roof; cost, $4,000; owner, Thos. B. Holland, 347 East Eighty-fifth St.; architect, W. A. Haight; builders, Wm. Byloe and Marshall & Haight.

Fifth Ave., e s, 75′ s Fourteenth St., five-st'y brick store, tin roof; cost, $50,000; owner, Estate of Mary Teliston, Wm. Brice, executor, 29 Chambers St.; architect, Robert Mook.

One Hundred and Forty-eighth St., s s, 100′ w Third Ave., three-st'y frame dwell., tin roof; cost, $3,000; owner, Selig Hecht, cor. Third Ave. and One Hundred and Forty-eighth St.; architect, Rudolph Pfeiffer.

Christopher St., No. 167, four-st'y brick factory, tin roof; cost, $9,000; owners, H. C. and J. H. Calkin, cor. Beach and West Sts.; architect, W. J. Tryer, Jr.; builder, Richard Shafter.

Second St., Nos. 172, 177 *and* 179, rear, one-st'y brick stable and dwell., tin roof; cost, $3,000; owner, Peter Lyding, 215 Second St., architect, F. W. Klemt.

Van Cortlandt Estate, Twenty-fourth Ward, frame barn, shingle roof; cost, $4,000; owner, A. Van Cortlandt, Kingsbridge; builder and architect, Antony Imhoff.

One Hundred and Twenty-fourth St., w s, 80′ 6″ w Second Ave., five-st'y brownstone front tenement, tin roof; cost, $18,000; owner and builder, Michael Fay, 416 East One Hundred and Twentieth St.; architect, J. H. Valentine.

One Hundred and Twenty-fourth St., n s, 108′ 6″ w Second Ave., five-st'y brick tenement; cost, $17,000; owner, Thos. J. O'Kane, 144 Alexander Ave.; architect, J. H. Valentine.

Amity St., No. 95, five-st'y brick tenement and store, tin roof; cost, $16,000, owner, Josephine H. Jenny, 407 East One Hundred and Seventeenth St.; architect, J. H. Valentine.

One Hundred and Twenty-first St., n s, 100′ w Pleasant Ave., four-st'y brick tenement, tin roof; cost, $10,000; owner, John B. Haskin, Fordham; architect, W. W. Gardiner.

One Hundred and Twenty-eighth St., n s, 200′ e Tenth Ave., two-st'y brick storage building, gravel roof; cost, $10,000; owner, D. G. Yuengling, Tenth Ave., cor. One Hundred and Twenty-eighth St.; architect, Paul F. Schoen.

Clark St., No. 20, four-st'y brick workshop, tin roof; cost, $10,000; owner, Lewis Moore, 25 Vandam St.; architect, C. F. Kidder, Jr.

Hester St., No. 102, five-st'y brick tenement and store, tin roof; cost, $12,000; owner, August Berbert, 88 Hester St.; architect, Fred. Jenth.

Tenth Ave., n w cor. Thirty-fourth St., 4 five-st'y brick tenements and stores, tin roofs; cost, total, $80,000; owner and architect, Henry Gledhill, 521 West Thirty-fourth St.; builder, J. C. Lyons.

Courtlandt Ave., n w cor. One Hundred and Fiftieth St., 2 three-st'y brick tenements and stores, tin roof; cost, $15,000; owner and builder, John Frees, One Hundred and Fifty-sixth St., near Courtlandt Ave.; architect, Wm. Kirsche.

Washington Ave., w s, 150′ s One Hundred and Seventy-seventh St., three-st'y frame dwell., tin roof; cost, $4,000; owners, Fannie and Kate Weiner, Third Ave., between One Hundred and Seventy-eighth and One Hundred and Seventy-ninth Sts.; architect, J. E. Kerby.

Franklin Ave., e s, 700′ n One Hundred and Sixty-ninth St., two-st'y frame dwell., slate roof; cost, $4,200; owner, Annie J. Stroud, 610 East One Hundred and Thirty-fifth St., architect, James Stroud; builder, L. Daly.

Fifth Ave., s e cor. Sixty-third St., four-st'y brick dwell., tin, slate and fire-proof roofing; cost, $85,000; owner, Chas. T. Barney, 82 Broadway; architect, R. H. Robertson; builders, L. N. Crow and Smith & Bell.

ALTERATIONS. — Important alterations are to be made in the Broadway entrance of the Hoffman House, from designs of Mr. Geo. Edward Harding.

One Hundred and Eighth St., n s, 350′ w Ninth Ave., three-st'y brick extension; cost, $7,000; owner, Aug. Schmid, on premises; architects, Lederle & Co.; builders, J. & L. Weber and Henry Schiffer.

Cedar St., s e cor. Church St., floor, raise roof on front, rebuild wall on Church St., etc.; cost, $4,000; owner, J. H. Meyer, on premises; architect, H. J. Heath.

Third Ave., w s, 75′ 7″ w One Hundred and Tenth St., raise one st'y; cost, $2,800; owner, Robert Bergman, 2010 Third Ave.; architect and builder, John C. Stickler.

Kingsbridge Road, s s, 500′ e Hudson Railroad, Spuyten Duyvel, raise one st'y, also a three-st'y brick extension, slate roof; cost, $3,000; owners, Isaac G. Johnston & Co., Spuyten Duyvel; architects, Kimball & Wisedell; builder, not selected.

Fifth Ave., n w cor. Twenty-seventh St., two and part four st'y extension, one st'y and basement altered for business purposes; cost, $35,000; lessee, John R. Franklin, 15 East Fifty-sixth St.; architect, Stephen D. Hatch.

Tenth Ave., cor. Grand Boulevard, One Hundred and Forty-third and One Hundred and Forty-fourth Sts., two-st'y brick extension, slate and tin roof; cost, $28,000; owners, Trustees of Colored Orphan Asylum, Aug. Faber, Chairman Building Committee, on premises; architect, Ralph S. Townsend; builders, J. A. Hopper and R. Townsend.

Ave. D, Nos. 155 *to* 173, deepen cellar, build new wall to support girder posts, brick piers, etc., cut opening in cellar-wall for windows; cost, $5,000; owner, D. H. McAlpin, 148 Ave. D; builder, Guy Culgin.

Philadelphia.

BUILDING PERMITS.— *Ontario St.*, bet. Seventeenth and Eighteenth Sts., 2 three-st'y dwells., 18′ x 48′; H. A. Miller.

Seprira St., e s, 60′ n Butler St., three-st'y dwell., 15′ x 30′; J. F. Fagely, owner.

Leiper St., cor. Foulkrod St., 2 three-st'y dwell., 21′ x 58′; Wm. Keas.

Day St., e s, s Girard Ave., three-st'y dwell., 20′ x 30′; Jno. Eichel, contractor.

Martha St., n e cor. Huntington St., 3 two-st'y dwells., 14′ x 44′; Thos. Kelly.

Clearfield St., No. 510, two-st'y dwell., 16′ x 44′; Geo. Blood.

Twenty-seventh St., s e cor. Oxford St., 5 two-st'y dwells., 16′ x 44′; Catterell & Johnson, contractors.

Front St., n Master St., three-st'y dwell.; Shegog & Quigley, contractors.

Nineteenth St., cor. Allegheny Ave., 2 two-st'y dwells., with stores, 20′ x 57′ and 18′ x 57′; J. N. Patterson.

Bethlehem St., s s, e Venango St., 4 two-st'y dwells., 13′ 6″ x 28′; Geo. Gillback.

Berks St., n s, e Hancock St., building, 74′ x 80′; Valentine Lint.

Aramingo St., e Frankford Ave., two-st'y building, 20′ x 40′; Liggett & Watson.

Frankford Ave., n s, w James St., two-st'y dwell., 16′ x 28′.

Lehigh Ave., s e cor. Oriana St., 3 two-st'y dwells., 14′ x 36′; Michael Fox, owner.

Wolf St., n s, bet. Sixth and Seventh Sts., two-st'y dwell., 16′ x 30′; W. J. Smith.

Portland, Oregon.

ALTERATION.— Woodard & Smith are putting a new front and a third story on their brick store, at a cost of $2,500; W. B. Todd, contractor; R. C. Ball, architect.

W. B. Honeyman is building a two-st'y house costing $6,000; T. Walker, contractor; he is also building for renting, cost $4,000.

BANKS.— J. Krumbein is preparing plans for a two-st'y brick bank building, 50′ x 107′, for Messrs. Scott & Vollmer, Lewiston, I. T.; cost, about $25,000.

Neer & Laromer have prepared plans for a two-st'y brick bank building, 25′ frontage, for Breymen & Summerville, East Portland; cost, about $15,000.

HOTEL. — Nicolai Brothers have commenced their three-st'y brick hotel; cost, $30,000; M. Owens is contractor for brickwork; J. Krumbein, architect.

HOUSES.— Mrs. Judge J. F. Watson is putting up a two-st'y house costing $15,000; W. B. Todd, contractor; R. C. Ball, architect.

Mr. Ellerson is building a two-st'y house; cost, $3,000; F. T. Merrill, contractor.

Carmichael & Stuart are building a house for Tyler Woodward costing $5,000.

N. J. Graham, architect, has prepared plans for a house for D. Childs; A. W. Powers, contractor; cost, $8,000.

L. Lichtensten is putting up a three-st'y house costing $30,000; Wm. Stokes, architect.

Mrs. Dr. Owens is building a house costing $4,000.

STABLE.— L. B. Magoun is building a two-st'y brick stable, 100′ x 100′; Anderson & Houghton, contractors; cost, $13,000.

TENEMENT-HOUSE. — Mr. Foote is putting up a double two-st'y tenement costing about $12,000.

St. Louis.

BUILDING PERMITS. — Sixty-five permits have been issued since our last report, twenty-one of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

Schickle, Harrison & Howard Iron Company, one-st'y brick pipe-foundry; cost, $20,000; contract sublet.

T. Ryan, two-st'y brick dwell.; cost, $2,500; J. C. Ralston, contractor.

Daniel W. McAllister, three-st'y brick warehouse; cost, $5,000; W. Merrill, contractor.

Emile Spohr, two-st'y brick dwell.; cost, $2,700; J. Siedhoff, contractor.

F. H. Aufderheide, two-st'y brick dwell.; cost, $3,200; C. L. Aufderheide, contractor.

J. A. Staunton, two-st'y brick dwell.; cost, $2,500; J. A. Staunton, contractor.

George Lange, 3 adjacent two-st'y brick dwells.; cost, $10,000; A. Beinke, architect; D. Fengmann, contractor.

J. Padbery, two-st'y brick dwell.; cost, $3,500; J. Rolfes, contractor.

Mrs. A. D. Rosevelt, two-st'y brick dwell.; cost, $4,500; T. Furlong, architect; J. J. Rosevelt, contractor.

J. Lehnbenter, three-st'y brick dwell.; cost, $5,800; Helm Bros., contractors.

Wm. Blaettemann, two-st'y brick dwell.; cost, $2,700; J. C. Ralstod, contractor.

J. G. Prather, three-st'y brick dwell.; cost, $4,900; Renick, architect; Rude & Luke, contractors.

W. L. Taulby, two-st'y brick dwell.; cost, $4,500; W. L. Taulby, contractor.

Collier White Lead Company, one-st'y brick

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ARCHITECTS, almost as much as engineers, will hear with regret of the death of Mr. John C. Trautwine, of Philadelphia, whose admirable little "Engineer's Pocket-book" is, with very many of them, in constant use, both for reference, and as a text-book in the principles of construction. It is impossible to say too much in praise of this work, which, in its frequent and carefully revised editions, formed his most important service to his own and the allied professions, and those who have studied it faithfully will understand, almost as well as if they had known its author personally, his conscientious honesty, industry and intelligent zeal in his work. As an engineer he belonged rather to the old school, his active practice having begun more than fifty years ago, but his devotion to the profession which he loved and served so well kept him always among the leaders of engineering opinion, while his practical knowledge made him to the last a most useful adviser. It is interesting to know, in view of the peculiar usefulness of his "Pocket-Book" to architects, that Mr. Trautwine was himself educated partly as an architect, in the office of William Strickland, a distinguished engineer and architect of his day, Dr. Thomas U. Walter, the architect of the wings of the Capitol at Washington, and the present President of the American Institute of Architects, being a fellow student with him. Under Mr. Strickland he assisted in the construction of the United States Mint and other buildings in Philadelphia, and himself made a competitive design for the Penn Township Bank, at the corner of Sixth and Vine Streets, in Philadelphia, which was accepted and carried into execution. Some years after his entrance into the office of Mr. Strickland, the latter, in his capacity as an engineer, was put in charge of what is now the Philadelphia, Wilmington and Baltimore Railroad, and Mr. Trautwine became his principal assistant, meeting in this capacity Mr. Benjamin H. Latrobe, of Baltimore, whose connection with the architectural part of the old Capitol at Washington furnishes so interesting a chapter in our professional history. From this time Mr. Trautwine's attention was almost entirely occupied with engineering work, his most important undertaking having been the final survey for the Panama Railroad. His affection for the more artistic employments of his early years seems, however, never to have left him, and to the end of his life he continued to sketch for pleasure in oil and water color, both of which he handled with unusual skill.

THE strikes in New York continue without material change, the Union delegates still racking their brains for means to intimidate or coerce the contractors without provoking a rebellion among their own constituents by loading them with too great a burden, while the contractors, who have begun to see that the delegates dare not order more men on strikes than they can find employment for elsewhere, are gaining courage to resist their insolent demands. The proprietors of the patent hod-elevators having, like the trustees of the Clark estate, declined to act as the tools of the Union officers, war was declared against them, and strikes were at once threatened in all the buildings where the apparatus was in use. A few contractors seem to have been alarmed by this menace, and a compromise was effected with them, but as it was clearly beyond the power of the delegates to carry out their threat effectively, the matter seems to have been dropped. An attempt was also made to whip back into line the German framers who returned to their duty in the buildings belonging to the Clark estate, and the contractors who employed them were notified that the wrath of the Amalgamated Union would fall upon them unless the framers were immediately discharged, but so far no attention has been paid to the admonition. The most recent accounts say that mysterious movements are going on among the Unions, and that hints are thrown out of a universal strike, with terrible consequences, but as one man can easily keep up a show of commotion, while another distributes hints, it may be safely assumed that the movement is nearly over, and that the pretence of serious movements to come is thrown out by the Union officers simply as a dust-cloud to cover their ignominious retreat.

A DISCUSSION is now going on in the daily papers over a suggestion made by the Grand Jury of New Orleans not long ago, that the bodies of persons dying of contagious diseases should be burned, rather than buried. An article in the *Princeton Review* supports this proposition by various arguments. According to its author, the soil of cemeteries may become saturated, not only with the emanations of the decomposing bodies, but with the "microbian organisms of disease," and it is even asserted as probable that "in a great number of cases people carry from cemeteries death-germs which soon result fatally." More evidence in favor of cremation is found in the well-known theory of Dr. Domingos Freire of Brazil, who believes that he has discovered the ferment of yellow fever, and has observed that the soil of a cemetery in which some victims of the fever lie buried swarms with the bacteria forms which he connects with the disease. Whether Dr. Freire scrutinized the soil of cemeteries not containing the corpses of yellow-fever patients, and found them free from the microbe in question, does not appear, but it is only fair to say that the value of his discovery is quite uncertain, until further investigations shall have confirmed his conclusions. As to the fatal effect of visiting cemeteries, people without theories to support will be likely to think that the conditions under which out-door funeral services are often held, taken in connection with the depressed mental and physical state of many of those in attendance, may very well account for a mortality among mourners which is far from being found among those who visit such places in favorable weather for mere pleasure. That thorough and scientific experiment may show the existence, in contagious diseases, of an organic poison so penetrating and persistent as to exhale in a fatal miasm from the soil of cemeteries is by no means impossible, but it is not yet proved, or even shown to be probable, and it is worth remarking that a French Commission, comprising, as most French Commissions do, the most eminent experts on the subject in France, which was recently appointed to consider the question of burning the bodies of persons dying of Asiatic cholera, has just rendered its report, in which the members express their opinion that the necessary handling of corpses in the process of cremation involves more danger of infection to the living than is to be feared from any miasm arising from bodies buried in the usual way; and they unanimously recommend, in consequence, that in case of the entrance of cholera into France, no change should be made in the present method of disposal of the dead.

A REMARKABLE pamphlet has been published by Professor Lucien Carr, Assistant Curator of the Peabody Museum of American Archæology and Ethnology, upon the Mound-builders of the Mississippi Valley, in which the author maintains that the great mounds of the West, the subject of so much speculation and romantic theory, are the work, not of an extinct race of highly civilized beings, but of the immediate relatives and ancestors of the Indians whom we now know. In his opinion, which is certainly confirmed by even a hasty inspection of the objects themselves, the stone tools, pottery and other articles taken from the mounds are not only not superior in design or workmanship to those of modern Indians, but are identical in design and material with those made in

the Indian villages to-day, so that, as he says, "it is impossible to distinguish between a series of stone implements taken from the mounds in the Mississippi Valley, and a similar series made and used by the modern Indians." "Nor," he goes on to say, "does this similarity stop with objects made of stone. On the contrary, it is believed to extend to all the articles, of every kind whatsoever, that have thus far been taken from the mounds." To the objection that the Indians of the historical period have shown neither the disposition nor the ability to undertake such extensive works of engineering as the building of the mounds involves, Professor Carr replies that the capacity and industry of the native North American tribes have been underrated. That they should have built none within the last two hundred years may be true, although even that is not certain, but this is perhaps the result of political changes or other circumstances, such as affect all nations. That the Indians of our own day have always known how to construct earthworks of a certain sort is well-known, and a group of powerful tribes, living for a long time at peace under a strongly centralized government, such as he believes to have once existed in the Scioto Valley, for instance, may well have felt themselves secure enough to undertake permanent engineering works, as well as to put in practice the extensive system of agriculture which has left its traces in the same district.

ARCHITECTS who practise in the large cities will be interested in the answer given by the law editor of *La Semaine des Constructeurs* to a correspondent who asks whether the usual commission can be collected, where old materials are used in building, upon the cost of the work as it would have been if all the materials were new. The reply to this important question is a very satisfactory one, at least for architects in France. It appears that judicial decisions have established the law there that for his services in the construction of a new building an architect is entitled, in summing up the cost upon which his commission is calculated, to reckon all materials, whether old or new, and whether furnished by the proprietor or not, as if new and furnished by the contractor; the courts holding that the work and responsibility of the professional man, and his proper compensation, are the same in both cases. Moreover, if, as often happens in cities, the demolition of structures already existing on the ground forms a necessary preliminary to the construction of a new building, and if the architect of the latter includes in his service the direction of the work of taking down and sorting the old materials, and the provisions for the protection of the public, he is entitled in France, by a decision of the Tribunal of the Seine, to collect commission upon the cost of these operations, in addition to his fees for work upon the new building.

THE New York *Tribune* gives an extraordinary account of some experiments with the Daft electric locomotive, about which a few vague paragraphs have before appeared in the newspapers. According to the *Tribune's* account, the electric current is supplied by means of a stationary engine and dynamo-electric machine, at one end of the track, to the rails, which conduct it to the locomotive. The current is of very low tension, and is not disposed to jump from one rail to the other, so that no special means of insulation are used, and even water between the rails would not, it is said, cause short-circuiting of the current. The moving motor is arranged to receive the current continuously, without the reciprocating movement of ordinary steam and electric engines, and a very high speed may be maintained without danger, and without loss of energy. In the trial witnessed by the *Tribune* reporter a train of small cars was drawn over a track one-quarter of a mile or so in length, and laid with various curves and grades. The little locomotive ran over its course with great speed, and found no difficulty in clambering up and down the steepest grade, which presented an ascent of no less than two thousand feet to the mile. As no stock of the company which furnishes the money for these experiments is for sale, there is room to hope that no deception was practised on the spectators, and that some means has actually been found for practically operating an electric motor with a current of low tension. According to the *Tribune* account the cost of the power obtained in this way is less than half that of the force developed in ordinary steam locomotives. If this should prove true, the Daft electric locomotive has a great future before it.

AN Electrical Exhibition is to be held in this country next year under most excellent auspices, the Franklin Institute of Philadelphia having determined to hold such an exhibition in September next. It is a little surprising to find so grave a body as the Franklin Institute concerned with a public show, but every one must acknowledge the advantage of such intelligent and responsible supervision for an affair which would, in the hands of speculators, probably become a mere engine of imposition. The exhibition is to include all kinds of electrical apparatus, machinery, tools and implements, with other articles used in scientific, mechanical and manufacturing business and investigation, and an effort will be made to obtain as many interesting objects as possible from foreign countries. The electrical exhibitions which have been held within the past two years in Paris, Berlin, London and Vienna have proved very successful, and that a similar one in this country, where electrical appliances are more generally employed than anywhere else, will be quite as interesting as the others.

THE purification of the Seine at Paris would seem to be indeed a serious undertaking, but it is by no means improbable that an attempt will be made within a year or two to carry it out. The new Technical Commission for the improvement of the sanitary condition of Paris, with that ambition to surpass everything that has been done before so characteristic of the French, has formally resolved to request the Government to take the necessary measures for prohibiting the discharge of impure water into the stream of the Seine or the Marne, in any part of their course through the departments of the Seine and Seine-et-Oise. Of course, the principal part of the pollution from which the Seine now suffers comes from Paris itself, but the Commission has already made up its mind that this can and ought to be kept out of the river, and expresses its conviction that the sewer waters of the city of Paris, as at present constituted, can without danger to the public health be submitted to purification by the soil, adding the announcement that plans are to be immediately prepared for the utilization of all the sewage of Paris not now disposed of at or near Gennevilliers, together with that of the neighboring towns, by irrigation works in the plains which border the river above the city. It is worth noticing also, as an interesting commentary on Colonel Waring's paper published last week, in which he speaks of the flushing of drains and sewers as the most important sanitary innovation of recent times, that the Technical Commission has voted to recommend that about two hundred and sixty miles of the Paris sewers should be provided with regular flushing, by means of tanks, each containing ten cubic metres of water, or about twenty-five hundred gallons, one of which is to be placed at the head of each branch sewer, and others at intervals of eight hundred feet, and arranged to be suddenly discharged once or twice in every twenty-four hours.

EVERY modern discovery has thrown new light upon one of the most remarkable legends of the Middle Ages. Most reading people now know something about the ptomaines, the intensely poisonous alkaloids which have recently been isolated from the corrupt juices of a decomposing body, and, although the first announcement of their discovery was received with incredulity, and almost with derision, are now recognized as distinct substances, existing in several varieties. Further research has shown that the new alkaloids are capable of entering into combination with other substances, yielding stable compounds having new properties, and it is found that the ordinary white arsenic easily combines with many of them, to form volatile liquids of frightfully poisonous character. The singular coincidence between this discovery and the history of the sixteenth century lies in the fact that one of the many traditions respecting the *aqua Tophana* of the Italian poisoners, that deadly drug which destroyed life instantly, and without fear of detection, relates that it was prepared by sprinkling white arsenic upon pieces of pork, and collecting the liquids which drained from them, adding subsequently a vegetable infusion. The first part of the process is exactly the same as that now found to be the easiest mode of preparing the arsenical ptomaines, and it seems altogether probable that experience may have led the refined Italian poisoners, who, as the stories go, could destroy their victims by the perfume of a bouquet, to the secret concoction of the very substances which beneficent science is now adding to the list of well-known, and perhaps medicinal drugs.

THE ARCHITECT AS A SANITARIAN.[1]

NOT long ago a plumber in describing to me the difficulties under which he, in common with the better class of his brethren, labor in competing for the work which architects have to give them, said that he had just come from an office in which the proprietor had been expressing the opinion that "this fuss about plumbing and drainage was all humbug," that "people used to live as long without it as we do now," and that he "didn't think there was anything in it." Probably this individual is not the only one of his kind, and it is well worth considering whether the "fuss" that some of us are in the habit of making about what we may call the organs of excretion in our buildings, is a proper and necessary part of our professional service to our clients, or merely the indulgence of a diseased appetite for novelty, to be gratified at our clients' expense. I trust there are not many among us who hold the latter view. It is true enough that our ancestors did not suffer as we do from what we call zymotic diseases, but we must remember that they practised, from necessity, and unconsciously, certain hygienic principles which were abandoned when plumbing began to be generally introduced into houses, and have just been rediscovered, to the annoyance of those who are indisposed to exert their brains in following the development of a new art, but to the signal advantage of mankind in general. We all can testify that our great-grandfathers and grandmothers lived to a good old age in houses whose appliances for drainage consisted of a sanitary shanty in the back yard, and a wooden spout from the kitchen-sink, extending through the wall, with its outfall decently concealed by a group of luxuriant currant bushes; but we do not realize as we might that the main effort of modern sanitary science is, so far as is compatible with our luxurious habits, to restore the relations of our living-rooms with the appliances for the discharge of waste matters to their primitive condition; disconnecting our bedrooms from the offal heap by an abundant current of pure air, instead of laying the pipes to conduct the fumes back under the noses of sick children, as the bad plumbers do; and gathering the drainage waters, not in a visible puddle around the roots of the currant bushes, but in concealed rivulets just beneath the surface, where they are equally within reach of vegetation, and less obvious to our eyes and noses, instead of storing them, as the bad plumbers and careless architects do, in huge caverns far below ground, to rot and fester, corrupting the subsoil for many rods around them, and sending back their deadly fumes into the house through the leaky pipes and ineffective traps which generally go with them.

Practically, our houses differ from those of fifty or twenty years ago in being more complicated, but it would be strange if that were a reason for not trying to understand the modern ways. Every architect worthy of the name has now every other detail of the construction of an ordinary house at his finger's end, and habitually plans his rooms, arranges his doors and windows, distributes his closets, and designs his stairs and partitions, with constant reference to the course of gas-pipes, furnace-pipes, or hot-water tubes, the requirements of fireplaces and flues, and the movement of elevator balance-weights or other machinery; and that any one should think himself justified in leaving the administration of a portion of the work far more important in relation to the health and happiness of the occupants of the house than the ventilating flues, or the heating apparatus, or the arrangement of the butler's pantry, to the care of a plumber or a sanitary engineer certainly seems to the mind of the ordinary client discreditable as well as impolitic. He expects, and with reason, to find in his architect a man as familiar with all the anatomy and pathology of the dwelling-house and its diseases as the physician is with the human body in sickness and health, and the family doctor who should proclaim his entire ignorance of the nature and functions of the bowels, on the ground that the ancients did not appear to have them, and that he thought they were a humbug, anyway, would have about the same prospect of increasing his practice among intelligent people as the architect who chooses to remain in similar ignorance of the digestive apparatus and operations of the modern dwelling-house.

It does not follow that if architects were to become, as they ought to be, the usual and proper advisers in regard to questions of house drainage, the sanitary engineer would become a superfluous member of society. On the contrary, nothing would do so much to develop the profession of sanitary engineering, and, what those who follow it faithfully think still more important, to stimulate and promote advance in that beneficent science, as an intelligent interest among architects in the results which have already been attained, and a demand for those better things which are sure to follow. We must remember that architects can rarely act as pioneers, especially in these matters. Not only have they no right to use their clients' money in experiments with appliances of whose value they are not reasonably sure, but they are bound to consider the comfort and health of the occupants of their houses, which the choking of a flush-tank, or the freezing of an outlet-pipe, might seriously endanger. All investigations into new fields, unless they choose to make them at their own expense, must usually be left to the sanitary engineer proper, who has the time, opportunity, and special knowledge for devising improvements in systems or apparatus, and for testing them thoroughly.

After these tests are made, and the results made public, it is not only praiseworthy in the architect, but, as it seems to me, one of his professional duties, to make himself acquainted with the new device at once, lest he should fail of doing for his next client all that might be done by an adviser who lost no opportunity of increasing his professional knowledge and skill. As an illustration of what may lie before us in the way of dwelling-house sanitation, it is worth while to consider a moment the present condition of the art of exterior drainage for country houses. Every one knows that by the enlightened and persistent efforts of sanitary engineers, the design and construction of plumbing apparatus inside the house have now been brought to a high degree of excellence. It is true that much remains to be invented in the way of securing perfect joints for iron pipes, and something, in this country, remains to be done in the way of introducing those clean and excellent kitchen and other sinks of earthenware which are so commonly used in England; but we are far advanced on a good road, and from our best houses all dangerous filth is now cast out by the appliances already in use quickly, and certainly never to return. Beyond the house we cannot say as much for the present condition of sanitary work. In the great majority of cases, even with the best plumbing within the building, the discharge from the pipes, as soon as it has passed the main trap, is hurried into an enormous leaching cesspool, built with walls of boulders insecurely balanced upon each other, and covered either with wooden planks, which soon rot through, or with flat stones. This foul pit, as we can all testify, forms the skeleton in the closet, so to speak, of nearly all country houses. To say nothing of such accidents as having horses and sometimes children break through the rotten covers, or the insecure arches, to be pulled out with difficulty, and perhaps not uninjured, the leaching cesspool is a source of constant contamination both to the ground around it and the air above it. It is very common, where such reservoirs are placed near houses, to cover them with loam and sow grass on them, but this only drives the gases which come from them to seek a roundabout but easy path into the atmosphere through the surrounding soil. There is no difficulty about this mode of exit; we know that wind passes freely through a brick wall, and that the emanations of a cesspool under a house meet with little interruption from a layer of concrete, and notwithstanding a certain superstition to the contrary, any person with a nose can convince himself in warm weather, that the stench from a covered cesspool is capable of being annoying if not dangerous to the inmates of all houses within a hundred feet radius at least. It is curious also that the products of the putrefaction going on in the cesspool, which probably contains some ammonia, have a marked influence upon the vegetation growing about it. In one case within my knowledge, a cesspool buried deep in the ground was covered with a flower-bed, and although the surface of the liquid in it was several feet below the ground, the flowers bloomed so brilliantly and grew so luxuriantly, as to attract constant attention; and in another instance, where the cesspool was nearly as far beneath the surface, and had a drain of loose stone, far below ground, connected with it as an overflow, the site of the cesspool, and the course of the overflow, were marked by an enormous growth of grass and weeds. Few persons who understand the principles of house drainage can see such sights as these without a conviction that our future progress in the art of clean living must be mainly in the direction of utilizing our house refuse, by completing the cycle of conversion of organic wastes into vegetable matter which nature has so beneficently provided.

How this is to be accomplished, we must ask the sanitary engineers to tell us, and they have already made answer in their attempts to perfect the method of sewage disposal by sub-surface irrigation which was introduced about ten years ago, and has been slowly growing into favor ever since. Most of us have probably used this system with success, but there may be some who have never met with a client adventurous enough to be willing to adopt it, and have for that reason missed the opportunity for personal experience of its working which would give them courage in recommending it to unwilling persons, while all those who have used it will be, I venture to say, glad to compare their experience with that of others.

In my own case, I can assert with truth that, although the sub-surface irrigation system, and still more the flush-tanks, which I have been the means of putting in, have been subject to occasional choking or overflow, the annoyance from them has not in a single instance been comparable with that which would have attended the use of a leaching cesspool in the same situation; and I can also say that although

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[1] A paper read by Mr. T. M. Clark, F. A. I. A., at the late Convention of the American Institute of Architects.

from motives of economy I have felt obliged to employ the leaching cesspool in many cases, in some of them I have afterwards had reason to repent the weakness which preferred a cheap, but temporary expedient to an arrangement of permanent value. It is to be regretted, perhaps, that certain details of this system of sewage disposal are protected by patents, since the idea of a monopoly always alarms persons unfamiliar with the subject, but it is fair to say that the royalty charged for the use of the Field flushing appliances is a very moderate one, and there are several good ways of applying the principle by which no patent is infringed. In fact, it answers well enough in many cases, at least for a time, to omit all automatic flushing appliances, simply running off the overflow of the tight cesspool, or settling reservoir in which solid substances and bits of paper are reduced by maceration to a liquid thin enough to pass through the pipes, into long lines of land-tiles, laid with open joints. It is true that the sluggishness of the current through pipes so laid leads to the deposition of sediment, which in time chokes the pipes, but three or four years may elapse before this occurs, and it is then only necessary to lift the pipes and clean them, when the whole is again in running order for a few years more. The whole operation takes but a short time, and involves the disturbance of the ground only to a depth of about a foot, presenting thus a marked contrast to the disorder and expense involved in building a new leaching cesspool, which is inevitable when the old one becomes lined with filth and non-absorbent. Where suitable flushing devices can be used, to hold back the sewage in the reservoir until a certain quantity has accumulated, throwing it then all at once into the pipes, so as to fill them completely, the flow is then so much more rapid as to prevent the deposition of sediment, all suspended matter passing with the liquid out at the joints, where it is speedily destroyed by the air contained in the soil, or taken up by the roots of the plants above it. The old-fashioned Field's flush-tank, I must confess, I have not been able to make such use of as I should like, the siphon being disposed to clog with grease, which is not easily removed from it. Moreover, the quantity of water discharged by it is insufficient to fill more than a small portion of the irrigation pipes, and a large part of the use which it is intended to perform is therefore lost. The later ones are much better in many respects, discharging five or six times as much water at each operation, and being simpler and cheaper in construction. It is not necessary, however, to pay Mr. Rogers Field a royalty to secure very efficient flushing. At my own house the result is secured by means of a tilting-tank, which works in a separate compartment of the settling-tank and fills gradually by means of a pipe from the main portion of the tank, so arranged as to dip always below the surface of the liquid contained in it, to prevent floating scum from getting into the pipes. The tilting-tank is hung on brass bearings secured to the brickwork, and so balanced that when filled to within an inch or so of the top it falls forward, emptying its contents into the small reservoir in which it works. From the lowest part of this reservoir seven lines of irrigation pipes radiate in various directions, and distribute the charge from the tank among the roots of the plants beyond. The advantage of this arrangement lies, as it seems to me, in the accessibility of every part. By lifting a flagstone the little reservoir containing the tilting-tank is uncovered, and the tank can be lifted out and cleaned, or a stream from a hose turned into the lines of irrigation pipe to clear them, with the smallest possible amount of trouble, and without descending into the reservoir at all. By lifting another flag the main settling-tank is disclosed, consisting simply of a brick cistern lined with cement. The flagstone cover is perforated with a small hole for the suction pipe of a pump, and after the liquid contents are pumped out the stone can be raised, and the bottom and walls scraped clean in an hour or so with long-handled scoops, leaving everything in as good condition as on the day the workmen left it. The settling-tank, which is long and narrow, has its longer axis coincident with that of the main drain-pipe from the house, so that a rattan can be readily pushed up through it to dislodge the grease and sediment which inevitably accumulate in course of time.

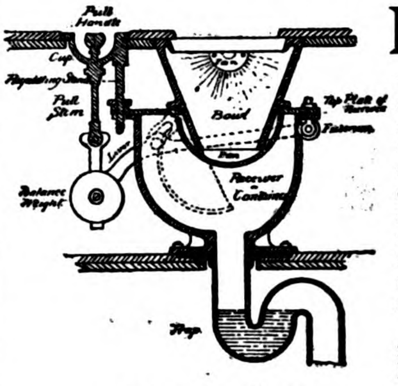
It is possible that I set too much value upon the point of perfect accessibility of all portions of the drainage system, but experience has shown its value inside the house, and the capacity for thorough cleansing, without disturbance of any portion, seems to me quite as important outside, where the chances of obstruction are, if anything, greater than in the house pipes.

In the laying of the irrigation pipes at the same place I was also obliged to make trial of some novel arrangements. A considerable part of the plumbing of the house is in the basement, and the total fall from the point where the soil-pipe passes through the wall to the lowest part of the ground is less than three feet. Deducting from this the amount required for the necessary fall in the pipes, and for the operation of the flush-tank, it became evident that only in one small spot would it be possible to lay the irrigation pipes at that proximity to the surface — eight or ten inches, which is requisite in order that the liquid brought by them may be absorbed by the grass roots. In one direction, however, the rise in the grade was comparatively slight, amounting only to about sixteen inches in a hundred feet, and knowing that in good soil the roots of many plants will run to a depth of two or three feet, I cut a wide trench the whole length, grading the bottom to a fall of four inches in the entire distance, and laid in it three lines of irrigation pipes, which were thus at the farther end about thirty inches below the sod. The trench was then filled to the top with loam, well enriched, and as soon as the proper time comes a hedge of rose bushes will be set at work to drink up the fertilizing liquid beneath them. So far as I know, the experiment in this form has never been tried, but there are so many situations, especially where house lots are small, where it is impracticable to bring the irrigation pipes within a foot of the surface without laying the main drain within the reach of frost, that the possibility of absorbing sewage by the roots of vegetation at a greater depth is a matter of considerable importance. The ground below the irrigation pipes is well drained, or it would not have been advisable to lay them in such a position.

It will at once occur to you that it would have been a great advantage if the house had been arranged with laundry wash-trays and servants' water-closet on the first floor, which would have rendered it easy to lay the irrigation pipes just below the sod in any direction over the place; and it is not impossible that the alteration may yet have to be made; but even this consideration will, I hope, serve to point the moral which I should like to convey — that the architect cannot delegate to others a question so important to the organization of a house as even the final disposal of its sewage outside. If he has had experience of the benefits of the irrigation system, or is disposed to believe in them from the testimony of others, he is very likely to be obliged to adapt the whole plan of the building to the conditions necessary for making its application possible. To some of you, perhaps, the study and observation needed for solving such problems with success may seem to be too much abstracted from the pursuit of the beautiful, but it is at least worth remembering that the true designer finds in all the practical difficulties which he encounters and surmounts new sources of beauty and picturesqueness.

SANITARY PLUMBING.[1] — IV.

THE PAN-CLOSET.



Ordinary Pan Closet

Fig. 1.

BY good rights this closet should have no place at all in our list, or anywhere else, because it possesses absolutely none of the merits which are to be sought for in closets; but for this very reason as well as on account of its great vogue and remarkable popularity, no type could serve better for the purposes of illustration. The initial-cut represents the ordinary pan-closet.

Referring to our table of requirements, the first relates to the manner of the flushing. It is sometimes asserted even by persons whose perception and education should have taught them better, that the pan-closet has the advantage of requiring less water for flushing than any other. It is difficult to understand how a thoughtful person can make such an error as this.

(*a*) The small quantity of water which descends when the pan is lifted only *appears* to flush the closet, but actually does nothing of the kind. It simply transfers the waste matters from the pan to the receiver below, where a part of it remains for an indefinite length of time, and undergoes decomposition. Each subsequent flushing adds more or less to the deposit thus originated, until the entire surface of the closet below the pan becomes coated with a mass of filth which sometimes attains a thickness of an inch or more, and cannot be removed without taking the closet to pieces, and burning it off. In fact the flushing stream does not remove the waste matter in the pan *at all* from the receiver, but simply refills the pan after it has been tilted. The work of ejecting the wastes from the receiver into the soil-pipe must be accomplished, if at all, by the discharge above it of the contents of the pan, the mere trickling of the flushing stream over the edge of the pan, when it has been filled, having no effect whatever upon the matters previously dropped into the receiver and trap. Hence it rarely happens that a single flushing is sufficient to carry the wastes into the soil-pipe. A second tilting of the pan is indispensable, and often several are required. With the pan-closet, therefore, the formation of the parts is such that the immediate removal of the waste matter into the soil-pipe and the proper scouring of the closet, including its concealed parts, is absolutely impossible, and it may therefore be said that the quantity of water required for the purpose is at a maximum. Of late a sprinkler or flushing-ring has been invented to sprinkle the inner surface of the receiver at the same time with the upper flushing. The effect of this addition is to complicate the machinery and heighten the cost of the closet and the consumption of water. The accumulations of filth are, by such an arrangement, delayed in those places which happen to receive the jets of water from the sprinkler, but hastened in others behind the ring, which the spray cannot reach, such as the under surface of the pan and of the bowl, between which the wastes are sometimes caught and compressed out of sight by careless usage; the upper surface of the receiver; and especially the

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[1] Continued from page 137, No. 404.

surface of the sprinkling-ring itself and the parts surrounding and covered by it. These parts receive the spatterings from the waste matters and the condensation of the gases and vapors of decomposition, and become finally encased with a coating of filth so hard that an ocean of flushing water could not remove them. The surface of the receiver is sometimes coated with enamel, to prevent the adhesion of wastes, but after a few years' use these surfaces become roughened by a fine deposit, and the incrustation begins as before. The parts which receive the direct impact of the water falling from the pan resist longest, but inevitably succumb in the end. Porcelain and earthenware receivers have also been made, but the result is the same as with the enamelled iron.

(*b*) The flushing stream does not enter the closet instantaneously upon operating the pull. The supply-pipe has first to be filled, which often causes considerable delay and inconvenience.

(*c*) The pan breaks the force of the flushing stream and prevents its passing through the receiver and trap in a compact volume. The effect and power of the "head" of the water falling from the cistern is thus totally destroyed, and,

(*d*) Its value as a scouring agent is lost.

(*e*) The machinery of the pan-closet is most ingeniously devised for the production of a variety of loud and disagreeable noises made in working it. The flushing is accompanied by a chorus of groans and squeaks, occasioned by the rust on the pan axis, more or less energetic and appalling as the age and rust of the closet increase; then follows the loud thud of the water falling from the pan, and the rush and splash of the flushing stream descending from the cistern; then a repetition of the groans and squeaks on a different key, as the rusty crank re-turns; a loud ring and a dull thump, as the empty pan strikes the bottom of the bowl and the heavy balance weight on the pull comes back to its bearing; and finally, from the cistern above, a bold, defiant crowing sound, occasioned by the rush of air back into the supply-pipe, appropriately terminates the mortifying concert, to the disgust and confusion of the occupant. A few of these noises may be cured; they are sometimes partly drowned by the greater noise of the flushing water.

(*f*) To lift and sustain, for the proper length of time, the weighted pull, and operate the pan and valve, require considerable effort, sometimes with the heavier closets beyond the strength of small children.

(*g*) The use of a special supply-cistern is possible and customary, but where the pan has to be operated by the same pull with the cistern valve, a complication of cranks and wires is needed. Only with a direct supply of water from the main can such a complication be avoided in the case of pan-closets, but the use of a direct supply is undesirable.

(*h*) When the pan is tilted, the peculiar movement is apt to cause a spattering, sometimes projecting a small quantity of water high up into the air.

Form.

The form of the pan-closet is

(*a*) Complicated and bulky.

(*b*) Its receiver occupies so much space below the bowl that there is no room for the trap above the floor. This is a most serious fault. The trap should never be buried out of sight and out of reach. Should it lose its water-seal through evaporation, siphonage, or other cause, or become in any way defective, the loss cannot be seen, and poisonous gases and germs of disease may make their way unobserved into the house.

(*c*) In all the pan-closets known to the writer the bowl is too wide, the surface of the standing water at its bottom too small and too far down below the seat.

(*d*) It is found that the lower the water stands in the bowl, the greater the spattering occasioned by the falling wastes. This surface can safely be brought within six inches of the seat without inconvenience in the use of the closet, and this distance, where the flushing is effected properly and without splashing, is the best.

(*e*) The bowl should be narrower and the sides should be more nearly perpendicular. A narrow bowl is (within reasonable limits) equally convenient whether used as a closet or as a slop-hopper; the flaring drip-tray will serve to direct the slops into quite a narrow bowl. In all these respects the pan-closet, as usually made, is defective.

(*f*) None of the trap, and but a small part of the interior of the receiver are visible from the outside of the pan-closet. The accumulation of filth in these parts cannot therefore be seen, nor, if seen, could it be reached and removed.

(*g*) The presence of the pan renders the use of this closet as a slop-hopper unsafe, because it causes spattering and overflowing when large quantities of slops are suddenly thrown into it. There should be no obstruction to the full outflow of the water.

Material.

The bowl of pan and nearly all other closets is made of enamelled earthenware. This is not the best material for the purpose, inasmuch as the enamel or glaze is neither thick nor strong enough to stand the usage it receives. It cracks or crazes and soon becomes discolored. Under the microscope the surface will be found covered with minute fissures, through which the acids of the waste matters penetrate into and corrode the porous interior of the earthenware, where they accumulate and decompose.

Construction.

(*a*) The pan, receiver, and all the machinery connected with them, are unnecessary, because the waste can be better removed without them, and they form no additional security against the entrance of sewer-gas. Until lately it has been regarded as important to hide the trap from view, because it was assumed that it necessarily retained at times waste matters, the sight of which was offensive. Now, however, we have learned that with properly constructed closets the trap can be perfectly cleared at each flushing, and that it is not only advantageous but necessary for perfect security that all parts of the closet and trap should be visible. Consequently we see that the pan and its bulky receiver are superfluous, and that the labor and money thrown away upon them might be saved for improving and strengthening the useful and necessary parts.

(*b*) There is nothing in the mechanism of the pan-closet to provide against the loss of its water-seal through evaporation, siphonage, or suction, though such a provision would be possible. The loss of the water in the trap would remain undiscovered, so long as the odor of the entering sewer-gas escaped observation, and it is known that the most dangerous sewer-gases are those which have no odor.

(*c*) There are two joints between the bowl and the trap, where there should be none.

(*d*) The connection between the bowl and the receiver being, in most pan-closets, made with putty alone, without bolts or screws of any kind, a slight shock will make a crack at this connection, and pan-closets are at any time liable to be rendered leaky at this point. The crack being out of sight and above the water-line, there is nothing to give warning of the entrance of foul gas. This is *one* of the ways foul air may enter. The receiver, usually coated with filth, acts in fact as nothing more nor less than a retort for the generation of gases of decomposition, which escape at numerous holes provided for the purpose. Every time the pan is tilted, the water discharged into the receiver displaces a corresponding bulk of foul air, giving a *second* way by which gases of decomposition may enter. The brass pan-journal passes through the receiver-shell, leaving generally at the point of entrance a *third* passage for sewer-gas. The joint between the receiver and trap is made with putty only. This joint is sometimes cracked by the shrinkage, settling or jarring of the floor-joists on which the receiver is screwed at the point of its connection with the trap. This leaves a *fourth* passage for foul air.

The shell of the receiver is usually cast very thin, and the castings are seldom air-tight before painting or enamelling. After several years' use it is liable to become perforated with an indefinite number of holes, which give *x* additional chances for the entrance of foul air.

(*e*) There is no frame around the bowl for the support of woodwork. The bowl itself and its connection with the iron-work of the closet is evidently too frail to allow of its sustaining the slightest weight or shock.

(*f*) In setting the pan-closet the receiver is screwed into the floor over a flange made in the leaden trap. Putty and paint alone are used. The trap has to be placed between the floor-joists, and the connection with the soil-pipe must be made in a contracted space. The proper adjustment of the various parts of the closet and its connection with the cistern-valve is more difficult, and requires more time on the part of the plumber than is necessary for the best sanitary water-closets.

Cost.

The cost of manufacture evidently depends upon the number, material, and complexity of the parts, and the manner of putting them together.

The pan-closet consists of nineteen different pieces, not including bolts and nuts, or fifty-one pieces including them. [A perfect closet can be made of three pieces, with the bolts and nuts to secure them.]

1. The bowl of earthenware.
2. The fan and its two brass fan-screws, nuts and washers (seven pieces).
3. The receiver proper, of cast-iron, and receiver feet and three screws (four pieces).
4. The receiver top-plate and its four brass bolts, nuts and washers (thirteen pieces).
5. The tinned copper pan.
6. The pan-journal.
7. The journal bolt and collar (two pieces).
8. The brass lock.
9. The brass tumbling-bolt, nut and washer (three pieces).
10. The brass or iron lever.
11. The brass fulcrum and bolt (two pieces).
12. The balance weight.
13. The weight regulator and set-screw (two pieces).
14. The pull stem and handle (two pieces).
15. The porcelain cup and cup-frame of iron (two pieces).
16. The regulating stand with its set-screw (two pieces).
17. The brass lock-check and bolt, nut and washer (four pieces).
18. The lead trap.
19. The brass trap coupling.

In addition to the above pieces, the receiver sprinkling-pipe and its connections, the ventilating-pipes, and in some pan-closets the overflow arrangements, make quite a number of additional parts.

To make these closets so that they shall yield a profit to the manufacturer, to the dealer, and to the plumber, when sold at the low price to which competition has reduced them, is only possible by reducing

the weight and the quality of the materials and workmanship to the minimum. They are usually of the most flimsy character, calculated to last but a few years.

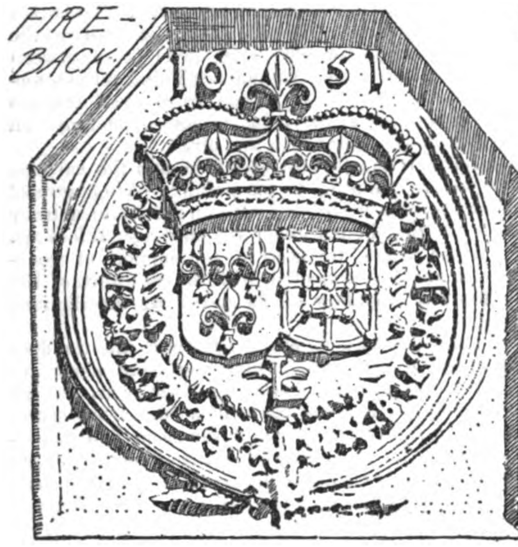
Appearance.

The appearance is not so prepossessing as to tempt one to omit the casing, and in fact the casing never is omitted, though a device so dangerous should always be exposed to full view, in order that such defects as occur on the exterior may be discovered as soon as possible. But the outside machinery is not interesting to look at, especially when covered with dust, which collects in every crevice and cannot easily be removed. So offensive is the sight of the pan-closet machinery to the eye of the sensitive Frenchman, that he often prefers to construct it all within the body of the receiver, swelling the latter to an abnormal size to receive it. Here it soon corrodes and becomes coated with filth in a very short space of time.

Let us hope that the days of the pan-closet will soon be numbered; for it is hardly possible to conceive of a device more ingeniously contrived, were the object to obtain, under the appearance of the greatest security, the greatest real danger.

The writer lately passed a small plumber's shop having a large show-window. There was room enough in this window to display a handsome and instructive system of sanitary appliances, arranged in such a manner as to inspire the beholder with a sense of the wisdom and skill of the proprietor. The exhibit in this window, however, consisted of three huge pan water-closets in a row extending from one side of the window to the other, with a few diminutive basin-faucets, plugs and valves lying on the floor at their feet. The sign above read "Sanitary Engineer." We wonder that the public should insist upon having unsanitary fixtures; but how can we expect anything better of them, so long as professors of hygiene themselves thus recommend them, with triple emphasis and to the total exclusion of what is really good!

NEW BOOKS.



THE recent publication in our own pages of the competitive designs for what is to be eventually the most important Protestant cathedral in the country, together with the rumor that the rejection, by the committee, of the more imposing of the designs was caused by its excessive certain cost, has led us to reflect on the great opportunities which an established church, with its large revenues controlled by a clergy versed to a high degree in archæology and architecture, places within the reach of the English architect. We have always had a feeling that it must be much more entertaining to be an English than — the volume of work being the same — an American architect, because the former seems to have submitted to his treatment, not only a great variety of buildings— perhaps not greater than comes within the reach of a good practitioner in this country — but several classes of work which are quite unknown here. In the matter of cathedral building, for instance, how rarely a chance of designing a cathedral falls in the way of an American. Cathedrals of any sort are not numerous here, and the few there are chiefly belong to the Roman Catholic church, whose dignitaries take good care that the work in all its branches shall be done only by those within the pale of the true faith, so that, this being a Protestant country, most of the profession are debarred from cathedral building. And there being few cathedrals — and those of course somewhat youthful — there is no occasion for the practice of the arts of design, and the exercise of the cunning resources of the scientific constructor in those "restorations" of the decaying monuments of past ages, which have fallen to the lot of a large number of English architects of the present generation. Another class of work which must excite the romantic, as cathedral work must arouse the religious, enthusiasm of those who have to do with it, and which, of course, is quite out of the reach of Americans, who lack a feudal ancestry, is the restoration or reconstruction of the feudal castles of Great Britain. Still another class of work within the reach of the Briton is the designing of buildings for erection in some distant colony where the architectural tradition, the routine of daily life, and the exigencies of climate compel him to come out from the ruts of familiar forms and strive for success on a new road to fame. The nearness of the Continent of Europe also offers kindred opportunities, and through public and private competition, and the freaks of social connection and acquaintanceship gives the English architect an occasion for exercising his fancy in a style of architecture, and for a purpose which home life and traditions deny to him.

Probably all English architects of mark have more or less frequently had the monotony of their lives interrupted by being called to work in each of these several directions. At any rate, the book[1] before us shows how varied, and, consequently, how entertaining was the professional life of the late Mr. William Burges, while, as it only professes to contain a selection from his works, it is impossible to say what more of the spice of life fell to his share.

In the several lines of work we have indicated, we have before us in the way of cathedral building a score of plates illustrating the general design and details of St. Finn Barre's Cathedral, at Cork, Ireland, which Mr. Burges gained in open competition in 1868, to the discomfiture of sixty-one competitors,— by so doing showing that it is not necessarily unwise for a young man of thirty-seven years to take part in an open competition. Also about half as many plates which exhibit the design made in 1873, and submitted by him — this time in a small limited competition — for the new cathedral at Edinburgh.

In the way of church restoration we are shown two views of the restorations which Mr. Burges carried out at Waltham Abbey in 1860 — one of his earliest labors; while to typify the restorations of those secular buildings whose walls are mute witnesses of high historic event perhaps, and whose atmosphere seems to be charged with the memories of chivalric romance, we have several plates showing the restorations that were carried out at Cardiff Castle for the Marquis of Bute; a series of works that were begun in 1865, and have been prosecuted steadily up to the present time, and are still far from completion. We cannot help feeling that if Mr. Burges did not actually consider this his greatest work, it was the work which most appealed to his peculiar temperament, and that it was while working at Cardiff Castle that he conceived of carrying out in his own London house many of the fantastic schemes of decoration which have made it so noted. Then, too, there is a plate showing roughly the restoration of Castell Coĉh, of which Mr. Pullan says, "Carcassone and Pierrefonds, restored by Viollet-le-Duc for Napoleon III, and Castell Coĉh, restored by Mr. Burges for the Marquis of Bute, are the only mediæval fortresses, to the best of my belief, that have been restored almost in their original integrity."

As to work for the colonies and on the Continent we are shown his design for a church at Constantinople in memory of the soldiers who fell in the Crimean war, which gained the first prize in a competition in 1856, and for which Mr. Burges laid the corner-stone two years later, though subsequently the work was taken out of his hands and entrusted to him who gained the second prize. There are also a couple of interesting plates, which show the School of Art which was built at Bombay in 1865. Not satisfied with working in so widely separated countries as Scotland and India, we find Mr. Burges embracing the opportunity of designing for erection in this country a large group of collegiate buildings, which the President of Trinity College at Hartford, Conn., not unwisely thought best to entrust to his masterful hand, and we have some half-dozen plates which show what the group is to be when completed. The most interesting plates, however, are those which show Mr. Burges's design for the Royal Law Courts, the failure of which to receive the suffrage of those who sat in judgment on the competition will always be regretted by many.

In domestic architecture Mr. Burges, judging from the specimens in the book before us, was not as successful as on the higher levels of architectural designs, and especially do we think the design of his own house, which has achieved much notoriety, here shows a most forbidding and unhomelike dwelling.

Such a monograph as this, which shows the work of a master at various periods of his life, and the manner in which he dealt with divers problems in many countries, is both curious and instructive apart from its purely architectural serviceableness, and the value of the book is increased by the judiciousness of Mr. Pullan's introductory notes which give briefly the necessary facts connected with each design.

We admire the modesty of the members of the Architectural Association of Boston, when they say, in the prefatory sheet of the initial issue of what we trust will be a long-continued publication: "Should the accompanying set of thirty plates meet with favor, the Association will publish similar sets from time to time." "Meet with favor!"[2] Is architecture practised by the blind? Have the artistic palates of men and women formerly endowed with critical taste lost the power of detecting the fine flavor of so savory a dish as this? If we do not err, the Association will find the last numbers of its limited edition of three hundred copies readily saleable at a premium.

Much as we admire the modesty of these young men, we more applaud the discreet reserve which leads them to state that future publication will not be made "oftener than once a year." Right. Such sketches as these are not to be prepared at fixed times and seasons. The hour and the mood must be propitious, the spirit of the artist

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[1] *The Architectural Designs of William Burges, A. R. A.;* edited by Richard Popplewell Pullan, F. R. I. B. A. London: 15 Buckingham St., Strand, 1883.

[2] *Sketch-Book of the Architectural Association of Boston* (300 copies printed). 30 quarto plates in portfolio. First issue, 1883. For sale by Cupples & Upham and W. B. Clarke & Carruth, Boston. Price, $7.00.

keenly awake, and the subject one that tempts to the exercise of one's best efforts.

The suggestion that in future publications a certain classification of subjects will be attempted is also an excellent one. The principle of co-operation is now-a-days applied to the making of books with marked success, and histories are written and dictionaries made in a few years in this way, which would have taken a single man a lifetime to perfect, and the common work gains in interest by the greater vivacity which is maintained throughout the work, and the variety of style lends a piquancy which the work of the same hand too often lacks when the effort is a long sustained one. The principle is an excellent one, but the best success of such an undertaking must depend on the skill with which the scheme is organized, the fidelity with which the controlling spirit performs his work, and the success with which he can maintain his hold on those who work with him.

The publication of this set of sketches is, we believe, instigated by the appearance of a similar set of sketches which were issued about a year ago by the younger members of the profession in New York. We have not that publication at hand, but we are sure that the Boston collection would not suffer in a comparison with its foregoer.

The subjects of the sketches before us were without exception encountered by their authors during their several trips in various parts of Europe during the last few years, and even to those who have no real interest in architecture they cannot but be pleasing. As they were not prepared with a view to publication, they — even if they be selected specimens of workmanship — prove how honestly our younger men are doing their work, and that a trip to Europe is not the holiday time that parents and guardians are too prone to fear it may be. They also prove that the camera is not having the effect of discouraging that active and constant practice with the pencil which is the corner-stone of artistic success.

The style of workmanship in which the drawings are executed is in general as various as their subjects, and yet many of the artists, evidently trained in the same school, have adopted an identical style in some of their slighter sketches. This is quite noticeable on one plate, where four sketches by different authors have been grouped together, each one of which might well have been made by another, or all four by the same hand without affecting the result: in themselves they form an admirable example of what an architect's memorandum-sketch should be. But when we turn to sketches over which some hours have been spent, the individuality of the artist comes out with emphasis. Rarely have we seen a more delicate and refined touch than Mr. Walker shows in his two sketches of Spanish fountains, and yet the work is so slight as to be hardly visible; but all the grace and sentiment of the originals, one feels, must be here, though perhaps refined by the eyes which saw and the fingers which drew them. After this plate, the most notable in the portfolio is Mr. Warren's elaborate rendering of a corner of the Ducal Palace at Venice. If it is a copy of a photograph, it has been accomplished with extraordinary fidelity and success; but if it is drawn from nature, it is a veritable *tour de force*. Of the many good contributions of Mr. Andrews, his sheet of capitals strikes us as the most interesting in treatment, and in style of rendering it finds an admirable foil in Mr. Chamberlin's sketches of similar subjects, which are so much more spirited than his sketches on another sheet that we wish the latter had not been published. To go farther in this way would but compel us to speak separately of almost every one of the thirty plates, but we cannot forbear to mention Mr. Wells's sketches, which show how much can be gained in effect by a judicious use of the brush in simple washes. There are other plates as worthy of mention as these, but we have said enough, we hope, to show that we consider this one of the most pleasing and graceful contributions that have yet been offered to the public by American artist-draughtsmen.

We cannot forbear repining that it is not within our power to take advantage of so much skill and talent, for our own and our subscribers' benefit, and make the illustrations of each issue of the *American Architect* as acceptable as these plates. Our processes and our presses are capable of producing results identical with these which are accomplished by the Forbes Lithograph Company; but since the pressure of commercial economy prevents our absorbing to ourselves the best of everything, as we would willingly do, we can but hope that the Association will meet with such encouragement as will make the continuance of its publications an obvious necessity.

Any one who looks over Mr. Gould's little book[1] will acquire the belief that one of the most important tools in a carpenter's kit is the steel square, and that there are few problems of constructive science which, by the aid of its myriad markings, a little simple arithmetical and geometrical knowledge, and a proper share of common-sense, cannot be solved; even the problems of simple topographical survey seem capable of solution by its ingenious manipulation, and carpenters who may have need of vertical measurements on buildings to which it is difficult to apply the measuring-rod and tape-measure, would do well to master the processes by which such measurements may be determined without quitting the standpoint which they have selected. The ordinary uses of the square for finding the lengths of braces, the bevelling of hip-rafters, the squaring of timbers, and the mitering of joints are fully and carefully explained and illustrated, and many of the problems are worked out under a larger number of the conditions they are likely to offer than seems to be quite worth while, as it leads the reader to expect that if he searches long enough he will find the exact solution he requires, and so checks the spirit of original mental effort that it should be the office of all technical books to encourage.

THE ILLUSTRATIONS.

DESIGN FOR THE ITALIAN MEMORIAL OF VICTOR EMMANUEL. BY MR. DANIEL BRADE, F. R. I. B. A.

[From the *Architect*.]

LANTERN. STROZZI PALACE FLORENCE. ITALY

WE publish this week an illustration of the design which was submitted in the competition for the National Memorial of King Victor Emmanuel. It was one of the designs to which a gold medal was awarded. A drawing of the design is in this year's exhibition of the Royal Academy. The following is a translation of the report which Mr. Brade sent with his design: —

"In submitting herewith the accompanying design for a memorial to the late King Victor Emmanuel II, I would add a few words in explanation of the design. As will be seen, it is proposed to construct a bridge across the Tiber, at or near the locality of the ruined Ponte Sublicius. The bridge would be flanked by triumphal arches at each end, and with colossal groups of statuary (varied), and along the bridge on both sides, double colonnades vaulted at top, the central portion forming a grand cortile or larger loggia. I would enrich the faces of the triumphal arches, and the friezes and spaces suitable, with statuary, sculptured decoration, inscriptions, and names of illustrious men and women of Italy — both ancient and modern — the form and nature of the structure being designed specially for and adapted to this purpose. The bridge and arches throughout and the abutments and river walls to be in stone, and the faces in Travertine stone, the columns of the triumphal arches in marble, and the capitals in bronze. The bassi relievi in bronze or marble of varied colors.

"As to the estimated cost, it will be judged from the nature of the memorial that it need not be carried out in its entirety, as to statuary and sculpture, at once. The large groups of statuary and decorative features can be erected in materials more or less costly, from time to time as funds permit, and they may be devoted partly to the commemoration of *future* notabilities and events of Italian history. But taking the work as herein indicated complete, with its pediments, cornices, coffered soffits, festoons, columns, and all architectural and sculptured carving (as apart from the human figure), I estimate the cost at 7,500,000 Italian lire, or 300,000*l.* sterling, leaving a sum of 60,000*l.* sterling to complete the statuary groups and artistic works named — say, in total lire, 9,000,000.

"In conclusion, I may briefly explain the *motif* or reasons for giving my design the form adopted. First, I consider that a memorial of this nature should be adapted mainly for and to its own special purpose, else it is not worthy of erection at all. The popular notion of coupling some other object therewith, such as a hospital, college, charitable or religious establishment, or other utilitarian scheme, is a vulgar and an ignoble one. For a great and national work the object commemorated is worthy in *itself* the cost and sacrifice involved in its creation. But if, as no doubt it is desirable, that a large structure like this should serve *some* practical purpose, I would point out that no more noble or useful purpose could be associated therewith than a public bridge, and on a place hallowed by one of the most heroic achievements of Latin history, the defence of the old Sublician bridge by Horatius Cocles.

"Further, I have conceived the idea that the reunion of the severed banks of the Tiber, as shown in this bridge, is a project worthy of associating with the union of the great Latin people and the consolidation of its empire and future greatness, as inaugurated and perfected by the late King Victor Emmanuel II."

The *Pons Sublicius* was the oldest and most interesting of the Roman bridges. Nothing is left of it at present except some of the foundations of the piers, visible at low water. Originally of wood, or piles, from which it takes its name, it was noted as being the bridge defended by Horatius Cocles, who in person withstood the entire army of Porsena till the retreating Romans succeeded in breaking it down behind him. It was subsequently rebuilt at three different times as a stone bridge, and finally destroyed by an inundation in 780, but some of the broken arches and the piers existed till the middle of the fifteenth century.

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[1] *Steel Square Problems*, together with a large number of Geometrical Demonstrations of practical Value to Mechanics. Illustrated by 60 engraved plates. By Lucius D. Gould. New York: Lucius D. Gould, 1883.

STABLE AND COACHMAN'S COTTAGE FOR MRS. MARK HOPKINS, GREAT BARRINGTON, MASS. MR. W. C. BROCKLESBY, ARCHITECT, HARTFORD, CONN.

INTERNATIONAL EXHIBITION BUILDING, NICE, FRANCE.

[From *Le Génie Civil.*]

WAREHOUSE, BLACKFRIARS, MANCHESTER, ENGLAND.

[From the *Building News.*]

ULM CATHEDRAL.

[From *The Builder.*]

For a description of the restorations, see the *American Architect* for April 28, 1883.

THE QUINTA SCHOOLS. BY MR. T. RAFFLES DAVISON, ARCHITECT.

[From the *British Architect.*]

These schools have been erected for the purpose of Sunday teaching. It has been necessary to provide also for numerous concerts and entertainments given during the year, and this has given the building somewhat more of a public than a merely denominational character, involving some consideration as to how the plan might be best arranged to efficiently answer its double purpose. The building will accommodate about three hundred and fifty. The infants' room is entirely separated from the general school by a hollow wall, and is shut off from sound by two doorways. It is provided with a large cooking-range for the cooking-classes regularly held there. The large school-room, of oblong shape, has two class-rooms on each side of it, opening into each other by revolving shutters, and divided from the main room by folding doors. At one end of the large room is a platform arched recess, and at the other is a wing containing library on the ground floor and class-room over, both these opening to it by folding doors. In one of the angles formed by this wing with the main building is placed a porch, and in the other a circular tower which, on the second floor, contains a semicircular class-room, the lower part containing the stairs and service entrance. There is another porch entering to the infants' room, and also to the platform end of the general school-room. A cellar, centrally placed, contains the heating apparatus, which consists of one of Constantine's convoluted stoves, from which hot air is carried to the large room, the side class-rooms, the infants' room, and the class-room over the library. All these apartments may be heated together, or either one separately, by this means. In order to be independent of the heating apparatus there are fireplaces in the library and class-room above it, as well as in the infants' room. There is a use of some new materials or processes in these buildings which we may refer to. Great care has been bestowed on the prevention of damp, and to this end the whole of the site has been covered with a layer of concrete, and the flooring placed over this is laid according to a new method lately patented by Mr. Edward Hughes, the senior member of the firm who erected the schools. The flooring consists of cubes of wood laid in cement over the concrete, the lower edges of the blocks being cut so that a dovetail opening is formed by the joint, into which the cement bed penetrates. There is thus formed a dovetail connection of cement with the cement bed, which gives enormous strength to the flooring, it being next to impossible to detach the blocks except by a very great leverage, such as is never likely to occur, even where it is used for railway or warehouse floors. A flooring such as this is especially nice for schools, as there is an entire absence of reverberating sound to the tread of the feet which is so distressing in a hollow flooring. In these schools the cubes are laid in a mixture of teak and pitch-pine, the teak squares forming the centres of diamonds in the pattern. The effect is admirable, and, if finely polished, would form a fine parquet. The exterior walling is executed in red bricks, with red terra-cotta mullions, heads, sills, etc. The interior is finished with brown glazed-brick dado and buff bricks over, the corbels, arch-mouldings, door-heads, etc., being buff terra-cotta. The winding stairs up the tower were made of cement concrete in wood moulds on the ground by the contractors, and provide steps probably more durable and far less costly than stone. Ventilation is provided for by the admission of fresh air through the window sills (directed upwards), as well as through hopper casements in the lead lights, with which all the windows are glazed, in transparent glass. The extraction is provided by two of Messrs. R. Boyle and Son's air-pump ventilators, and by flaps (opening by cord and pulley) over the windows. A large amount of teak is used in the wood-work. The illustration is from a drawing in the Royal Academy this year, and was sketched on the spot after the completion of the building.

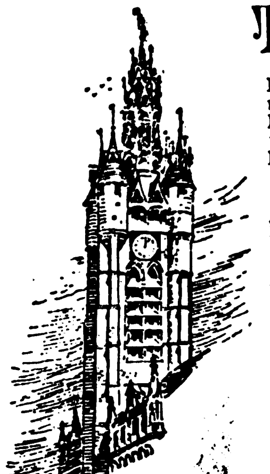
COMPETITIVE DESIGN FOR A MECHANICS' DOUBLE COTTAGE, SUBMITTED BY "*Harrison*" [MR. H. H. ATWOOD, BOSTON, MASS].

For description see the following article.

The Explorations at Assos. — Assos was delightful, one of the most beautiful situations I ever saw; the climate exquisite, the hospitality delicate and friendly, the ruins far beyond my expectations in magnitude and interest, the drawings a miracle of faithful and intelligent skill. I am sure that nothing like them was ever undertaken. When they are published they will make previous work of this sort seem crude and untrustworthy. This year's work has been very fruitful in results and I was relieved to find that everything had been done that seemed really worth doing. — *Extract from a Private Letter.*

THE COMPETITION FOR A MECHANICS' DOUBLE COTTAGE.

DESIGN SUBMITTED BY "*Harrison.*"



BELFREY AT DOUAI. FRANCE.

This is a simple, easy house to build, as will be seen by the drawings, with no over-hanging projections, studs running from sill to plate, with a very simple roof. It is proposed to build in the vicinity of Harrison Square, in the outskirts of Boston, labor, materials of all kinds and good railroad accommodations being handy. The following is a short description:

Specification.

Excavating: — The necessary digging is to be done, material being deposited on the lot where directed

Foundations and Cellar Wall: — To start from a solid bottom, to be of local stone, the exposed portions being random rubble-work, neatly pointed.

Brickwork: — Consisting of piers and chimneys, to be hard-burned common brick, the exposed parts of chimneys laid in red mortar, and flues plastered in the usual manner.

Lathing and Plastering: — Spruce laths to be used throughout, plastered with a good coat of mortar, and finished with a skimming.

Lumber and Framing: — To be spruce of the following dimensions: sill, 4″ x 6″; girders under floors, 6″ x 8″; first and second floor joists, 2″ x 8″, 16″ on centres; second-story ceiling-joists, 2″ x 4″, 24″ on centres; posts, 4″ x 6″; wall-studs, 2″ x 4″, 16″ on centres; partition studs, 2″ x 3″, 16″ on centres; plate, 4″ x 4″; rafters, 2″ x 6″, 24″ on centres.

Boarding and under Floors: — To be good dry mill-planed spruce boards.

Roof-Boarding: — To be matched mill-planed spruce boards.

Outside Finish: — To be clear seasoned spruce, roofs to be covered with cedar shingles laid 4½″ to weather, and flashings of heavy zinc: other parts to be as indicated, shingles in second, and clapboards in first story, sheathing paper to be laid under all.

Gutters to be Stearns's, 4″ x 6″ cypress, with leaded joints. Conductors to be corrugated galvanized-iron, connected to gutters with heavy lead goose-necks.

Under Floors: — To be good clear seasoned spruce floor boards, in narrow widths, and neatly smoothed off.

Window Frames and Sash: — To be the regular mill-work frames, having pulley-stiles, parting and stop beads, with box for weights. Sash 1⅜″ thick.

Door Frames and Doors: — Frames to be rabbeted plank, with stops.

Mill doors 1⅜″ thick, four panels, flush mouldings; front doors 2″ thick, all pine.

Stairs: — To be strongly constructed as shown on plans, with an ash balustrade.

Inside Finish: — To be of dry seasoned spruce ⅞″ thick, and 4″ wide; base, first story, 6″ high; second story 5″ high; pantries and china closets to have shelves and cupboards; bath-room to be sheathed, water-closet to have double cover, etc.; all rooms to have a wood shelf 10″ wide, 1¼″ thick, moulded face, with brackets under.

Gas Piping: — To be of sizes required by the local gas-company: the owners to provide fixtures.

Plumbing: — To consist of a kitchen sink, bath-tub, water-closet and bowl for each house.

Painting: — To be three coats outside, and two coats inside, the outside in three tints, the main roof not to be painted. The pulley stiles to be oiled with linseed oil, and also the kitchen floors.

Glass to be second quality double-thick throughout.

Jobbing and cutting for pipes, etc., is to be done, all rubbish, etc., collected during the progress of the work is to be removed, and the houses left in good condition.

Owners to provide furnaces.

The following bill of quantities and prices, obtained from a reliable Boston builder, whose proposal is attached includes both houses, and also the builder's profits: —

Excavating, 11,826 cu. ft. = 438 cu. yds., @ 25 c.				$109.50
Foundations and cellar wall, 112 perch (laid), @ $3.75				420.00
Brickwork: chimneys and piers, 11 M. (laid), @ $16				176.00
Frame.				
Sills, plates, walls and partitions,		4500 sq. ft.		
First floor,		2180 "		
Second floor and piazza roof,		2268 "		
Second floor ceiling joists,		1240 "		
Main roof,		2120 "		
		12,308 "	@ $14 per M	173.00
Outside Boarding.				
Walls,		3744 sq. ft.		
Roof,		1340 "		
		5084		
Outs.				
First story, 22 windows, 4 doors,	410 sq. ft.			
Second story, 16 windows,	330 "			
		740 sq. ft.		
		4344 sq. ft.,	@ $13 per M	56.23
Under Floors.				
First floor,		1380 "		
Second floor,		1320 "		
		2700 "	@ $12 per M	32.00
Shingles.				
Second story and piazza roof,		1680 sq. ft.		
Gable and dormers,		160 "		

Main roof, 1340 sq. ft.	
3180 "	
110 sq. ft. to 1000 shingles; 29 M. @ $3	$87.00
38 windows (including frames, architraves, sash, glazing, lines, weights, and hardware, no blinds used), @ $3.50	133.00
38 doors (including architraves, thresholds and hardware), @ $5	190.00
2 front doors, @ $8	16.00
Stairs (flight from first to second floor, and cellar stairs)	70.00
Clapboards, first story, 1780 sq. ft. (1,000 clapboards lay 1100 sq ft.) = 1650, @ $26 per M	34.70
Sheathing-paper, 4 rolls, @ $3	12.00
Nails, 800 lbs., @ $4	32.00
Gas-piping	25.00

PLASTERER'S WORK (including lathing).

Walls.		*Ceilings.*	
First story,	4304 sq. ft.	First story,	1380 sq. ft.
Second story,	4420 "	Second story,	1320 "

11424 sq. ft.

Outs.

First Story.		*Second Story.*	
22 windows,	330 sq. ft.	16 windows,	240 "
4 outside doors,	84 "	20 doors,	420 "
18 inside doors,	378 "		

1452 sq. ft.

9972 =

1108 sq. yds., @ $20	221.60
Base, 932 ft., @ 3 c.	27.96
Plumbing (kitchen sink and bath-room in each house)	300.00
Gutters, 80 ft., @ 10 c.	8.00
Conductors, 70 ft., @ 12 c.	8.40
8 piazza posts and brackets, @ $3.50	28.00
Painting (outside work, except roof, and inside work included)	250.00
Labor	600.00
	$3,129.16
Architect's commission, 5 %	156.45
Total cost	$3,285.61

BOSTON, May 16, 1888.

My estimate for building double house, according to "*Harrison's*" plans, is $3,129.16.

J. F. TALBOT, Builder.

MR. HILL ON THE REPORT OF THE INVESTIGATING COMMITTEE.

TREASURY DEPARTMENT,
OFFICE OF SUPERVISING ARCHITECT, September 21, 1883.

HON. CHARLES J. FOLGER, Secretary of the Treasury:—

Sir, — The Committee of Investigation of this office, whose report has been recently published, have arrived at some conclusions which it appears to me neither the law nor the evidence justify. They have in my judgment made some very grave mistakes in the application of the evidence before them, have failed to appreciate the value of certain testimony and certain important elements in the matters which have received their attention, and in their interpretation of the law relating to advertising have given a rigid and strict construction which it seems to me is in accordance neither with its letter nor its spirit. I believe, too, they have failed to understand both the character of the office and the system under which its business is transacted.

It is but natural that, so far as these errors have contributed toward the conclusions which are unfavorable to my administration of the office, I should earnestly protest. They also, in my judgment, do great injustice to my superior officers who have in any way had to do with its business, and with my numerous subordinates, who I believe have given to its work years of conscientious and intelligent labor.

While the presumption may be in favor of the committee that, within the scope of their limited time and divided duties, they have rendered an honest and impartial judgment, I shall certainly not yield the strong presumption in my own favor that in the technical affairs of my office my own trained and professional judgment is better than theirs. I desire, therefore, to indicate, in as brief a manner as possible, the respects in which I regard their conclusions wrong.

Before proceeding to remark upon the several matters covered by the report, it may be proper for me to call your attention to certain peculiar and unique features of this investigation. You are aware of the grave character of the accusations, and of the vaunting manifestoes of Mr. Murch, who was so free in his scandalous statements on the floor of the House, and so persistent in his alleged efforts to aid you in unearthing frauds. You have seen the unlimited scope of their charges, which embraced nearly every offence known to the law, and the vague and indefinite specifications which made any orderly and regular proceeding next to impossible, and multiplied the obstacles in the way of such a defence as that to which any accused person is entitled as of right under the fundamental law. With such conditions as those existing, and with the rude machinery of the court as organized, I appeal to your judgment whether it were probable that justice would be done to an accused laboring under such overwhelming disadvantages. The defence could make no objection to the organization of the court, or to its methods, without at once raising the presumption of fear or an accusation of effort to suppress evidence and prevent a fair investigation. The issues were undefined, and irrelevant evidence grew in proportion, to cloud the judgments and poison the minds of both the committee and the public, to whom it sat with open doors. I do not deem it necessary to enlarge further upon the unfavorable conditions which I met in my defence. I came out of it with such a sense of disgust at the personal hardship which I was compelled to suffer through more than two months of unbroken and uninterrupted insult, as to be reasonably indifferent of what the results of such a disorderly and irregular proceeding might be.

Whether or not on these accounts I may with justice appeal to you for a very careful review of the findings of the committee, is a question which I submit to you with some degree of confidence.

The charges relating to the modification of the *Fifteen per cent Contracts* were those which particularly interested Mr. Murch, and were the only ones about which he pretended to have any personal knowledge. This matter occupied the larger share of the attention of the committee, and received whatever benefit Mr. Murch's personal services could give.

The committee say: "Your committee would not be willing to accept Mr. Steinmetz's unsupported estimates as proof of fraud or incompetency. . . . Your committee finds that the prices agreed upon were largely in excess of the then ruling market rates, and had the contracts been cancelled and new ones made by advertising proposals, the Government could undoubtedly have secured these lower rates. But very important legal and prudential, as well as economical considerations entered into the settlement of that question, which appears to have been weighed with great care and deliberation by the committee, whose work was subsequently approved by the Secretary of the Treasury."

This finding is entirely consistent with the evidence, and I deem it necessary to refer to this branch of the case only because of the fact that while the committee call attention to other evidence offered, they make no allusion to the fact that the chief witness in this branch of the case, and the originator of this investigation, admitted under oath his own peculations, and was shown by the records to have been guilty of the very frauds of which he was complaining.

Of course this fact is no defence for any possible offence by any one else, but to my mind it is a very material fact to show the character and motive which developed this attack upon the office. This is the man who by a parade of pure hands and an averment of horror at official peculation, has commanded the attention of the Department.

I cannot but think that this fact was worthy of remark on the part of the committee, particularly as the accused has practically no remedy against his slanderous statements.

The committee base their verdict of *official* favoritism upon the dealings of the office with two parties, viz.: Geo. L. Damon and Bartlett, Hayward & Co.

The respects in which improper favor is alleged to have been shown to Mr. Damon are two; viz.:—

First: In the purchasing of safes and vault-work from him without advertising each fiscal year.

Second: In the award of the contract for fire-proof shutters for the custom-house building at Cincinnati, O., to the United States Fire-proof Shutter Company (of which company Mr. Damon was superintendent), while the Manly & Cooper Manufacturing Company were the lowest bidders.

The respects in which improper favor is alleged to have been shown to Bartlett, Hayward & Co. are three; viz.:—

First: In obtaining plans, specifications, and schedules for heating-apparatus for the larger buildings from a heating engineer who was a member of that firm, without inviting bids therefor from other parties.

Second: In the appointment of a Mr. Newton as inspector of materials for heating-apparatus for Chicago Custom-House Building: said Newton having been an employé of Bartlett, Hayward & Co., before his said appointment, and having returned to their employ after completing his service to the Government.

Third: In giving to Bartlett, Hayward & Co. a large percentage of the work of repair on the heating-apparatus of the numerous public buildings, without advertisement.

I propose to direct your attention particularly to each one of these items to illustrate the errors which, in my judgment, the committee have made.

Favoritism to George L. Damon.

First: In the failure to advertise for safes and vault work at least once in each fiscal year.

The committee say that advertisements for proposals for the supply of this class of work were made September 16, 1875, and August 5, 1879, and that since the last-named date Mr. Damon has finished all or nearly all of the work of that character ordered by the Supervising Architect for the use of the Department, and that no other advertisements for such supplies were made during that period. While it is perhaps immaterial to the issue, it is proper to say that the last statement is incorrect.

The vault work for the Sub-Treasury and Mint at San Francisco, and the Sub-Treasuries at New York and Philadelphia, was advertised, and contracts were awarded to Mr. Damon, who was the lowest bidder in each case. These several contracts were in evidence before the committee.

With the above exceptions, the safe and vault work have been purchased from Mr. Damon, without the yearly advertising, since the fiscal year ending June 30, 1880. The committee say that this was in direct conflict with the letter and spirit of the law. (Sec. 3709, Rev. Stat.)

I will not enter into argument as to whether vaults and safes can be classed as "supplies," within the meaning of the Statute, a doctrine which it seems to me is contradicted by the fact that the accounts for these expenditures have been approved and settled by the proper accounting officers, so far as I know, without objection. I maintain, however, that beyond all doubt there has been a compliance with the spirit of the law, in that the rates paid were those secured under the last advertisement, in 1879. The purpose of the law is to give the Government the benefit of the very lowest rates in its purchases.

Evidence was furnished to the committee that these rates were exceedingly *low*, and that safe manufacturers had declined to furnish work at these rates, and there was no attempt made to contradict this evidence, as indeed it is beyond all contradiction. The rates had been fixed by competition, and were so far below market rates that I was satisfied that to advertise would be only to incur unnecessary expense, and that without any prospective advantage to the Government.

This action, it is submitted, was not favoritism to Mr. Damon, but certainly was in the interest of the Government, and in vindication of my judgment in this matter, and as proving conclusively that the finding of the committee is erroneous, I beg leave to call your attention to the results of the recent advertisement for proposals for this class of work. In response thereto there were only two bidders. Mr. Damon has advanced his rates on an average of from twelve to fifteen per cent, while the rates of the other bidder are over seventy per cent higher. The contract is of course awarded to Mr. Damon, and by this advertisement the Government sustains a loss of from fifteen to twenty thousand dollars.

Second: In award of contract to United States Fire-Proof Shutter Company for fire-proof shutters for the custom-house building at Cincinnati, O., the Manly & Cooper Manufacturing Company being the lowest bidders.

The committee are in error in stating: "The arrangements for making the proposed test seemed not to have been sufficiently perfected for a practical test." The details of the construction of the furnace, to be sure, were not fully presented to the committee, as I did not see what part it could play in this investigation, and I did not suppose that the qualifications of the committee as experts were such as to lead or entitle them to pass upon this question. They seem to have been governed by the opinion offered in the testimony of Mr. Rettig, a draughtsman who (as he admitted) never made a fire-test nor saw one.

Mr. Rettig says: "I have not witnessed any experiments before, but my experience in engineering would tell me that the test as arranged would not be of any great value to determine the superiority of one shutter above another for the reason that sufficient heat could not have been generated."

The preparations for the test were complete, and the construction of the furnace similar to that in which tests of shutters were made by me in 1879. In those tests some of the shutters were practically destroyed, and heat enough was generated to melt the grate bars, which were railroad iron.

This result surely ought to outweigh any mere opinion that the arrangements were not sufficient for the test. At the conclusions of the committee in this case I must confess surprise.

Aside from the fact that the lowest bidders presented for test an article entirely different from that contemplated in their proposal, the fact that Manly & Cooper were simply experimenting with an article they had never manufactured, and evidently did not understand, and that the specified conditions which were positive in language were not observed by them, seems to have had but little weight with the committee. Great stress seems to be given to the fact that I did not save $20,000, the difference between the lowest and the next bid. I claim that I saved $124,666.65, the amount of the lowest bid, as under no consideration should such work have been permitted to go into a public building, and money invested in it I should consider wasted.

The evident groping of the Manly & Cooper Co. after something fire-proof, —their inability to furnish in six weeks what they stated they could prepare in ten days — the wretched character of the work when finally prepared satisfied me then as it does now, that it would have been folly to award the contract to them.

Favoritism to Bartlett, Hayward & Co.

First: In the ordering plans, specifications and schedules for heating apparatus from a member of this firm without inviting bids therefor.

The committee expresses the opinion that "proposals should also have been obtained for drawing plans and specifications for the Chicago, St. Louis, Philadelphia and Cincinnati heating apparatus, that some competitive price might at least be fixed."

The preparation of such plans and specifications is not merely mechanical or routine work. They embody the opinion of an expert upon a complicated problem, and each case requires personal study of the same character that a lawyer gives to a difficult case. It would be as impossible to obtain suitable service by the lowest-bidder method in the one case as the other.

I employed for this work the most competent expert within my knowledge, and paid him a price equivalent to the usual professional fees or commissions.

Second: In the appointment of Mr. Newton as Inspector of Materials for heating apparatus for the Chicago custom-house building, said Newton having been an employé of Bartlett, Hayward & Co., I have nothing to add to the testimony in this matter which was before the committee.

That the motive of his employment was not to favor Bartlett, Hayward & Co., and did not as a matter of fact, I think even the report of the adverse Expert Committee will show. Admitting the reliability of their findings, the value of variations, so far as they could be of any possible benefit to the contractors, is less than two hundred dollars, and the committee give the contractors no consideration for the extra work done by them, for which they made no charge.

But the findings of this expert committee are distinctly and emphatically contradicted in material points. Their examination was made surreptitously, although your committee had distinctly agreed that the defense should have notice of the intended examination. Such notice was not given, but with the allowance of the truth or their findings the sum is so insignificant in comparison with the contract price, $94,948, that in a private contract of this magnitude it would not be thought worthy of consideration.

Third: The committee say that Bartlett, Hayward & Co. have had the "lion's share" of this work.

The policy of the office has been, when repairs were found to be necessary to any heating apparatus, to employ for this work of repair the original builders if they were accessible. This is believed to be the most economical as well as most reasonable method, and I have never believed, and do not believe now, that the law requires advertising in respect to these repairs.

These are the facts and the only facts which the committee cite in justification to their verdict of *Official Favoritism.*

I cannot pass unnoticed the following clause in the report, viz.:—

"Such official favoritism is so manifold in the conduct of the Supervising Architect's office as to give some color of truth to a statement made by Mr. Coleman in his argument that for everything that goes to make up a building, Mr. Hill has some one person or some one firm with whom he deals to the exclusion of everybody else."

This is an insinuation merely, and surely should have no place in a report of this character.

Either Mr. Coleman's statement is true or it is false, and it is precisely to ascertain whether such mismanagement existed that the committee was appointed.

The fact that they conclude that in two cases favoritism was shown hardly justifies their deliberate statement, that this gives color of truth to Mr. Coleman's broad statement. I pronounce the statement false and without justification. If it be true the committee have certainly neglected their duty in not ascertaining that fact.

While it is true that for certain specialties other than those mentioned in the investigation, I apply to certain persons or firms — as, for instance, safe-locks from Sargent & Greenleaf, sash-fasteners from the Morris Sash-Lock Company, and certain plumbing goods from Meyer, Sniffen & Co. — yet for the general materials and labor which enter into the construction of a public building, and which consume by far the largest part of the appropriation, such as masonry, iron-work, joiners' work, plastering, slate, and copper work, etc., I defy any one to point to anything that indicates that there is a grain of truth in this assertion. An inspection of the list of contractors on work under this office would dispel any such idea.

The committee seem to have had no hesitation in disposing of the question of organization of this office. Although I have given the matter considerable reflection, I am still unable to submit any scheme of re-organization which has not in it serious defects. It may be that a long experience in the office has led me to entertain an undue appreciation of the difficulties of the problem.

The committee, fortunately, is not handicapped by any such disadvantages. They were repeatedly urged to visit the office and ascertain the details of the present system. To these urgent requests they never responded. I submit that it is not in the interest of the Government to thus summarily dispose of a grave question of administrative policy.

Very respectfully, Jas. G. Hill,
Supervising Architect.

NOTES AND CLIPPINGS.

Factory Chimneys. — It is well known that the round form is the best for the chimneys of factories and workshops. It facilitates the escape of the smoke, and gives less hold for the wind, besides requiring less material for construction. Round chimneys, however, are more difficult to build, so that in some places the want of workmen who are skilled in this kind of construction leads to the adoption of a square or octagonal section. In order to facilitate the erection of round chimneys, M. Houzen, of Nüremberg, prepares materials cut in the form of wedges, corresponding with the radius which the chimney is to have, so that the construction presents no kind of difficulty. — *Chronique Industrielle.*

Evolution of Heat by Different Illuminants. — The following figures show the comparative product of heat given off by seven different kinds of light, each light being equivalent in power to a hundred candles. The two forms of the electric lamp, the arc and the incandescent, are incomparably below any other kind of light, the arc being of the two the lowest heat producer. The caloric of an arc lamp of 100 candles power is given as from 57 to 158 calorics, that of the incandescent lamp of equal brilliancy being from 290 to 536. The argand gas-burner is represented by 4,860 calorics, a colza-oil lamp by 7,200, a paraffine candle by 9,200, while a tallow candle which would give the light of any of these lamps would produce no less than 9,700 calorics of heat. — *N. Y. Mail and Express.*

Malarial Fever in Florence. — A correspondent writes from Florence: "The cholera panic has had an effect on our municipality which no pressure or complaint has ever had, and perhaps Florence never was so clean as to-day. The Ghetto, the by-lanes, and the recesses of the old market have been explored, and the filth of years (I speak without exaggeration) moved for the first time in this decade. The activity cannot last; it is too abnormal, and too much of an effort. When it requires the fear of cholera to make a people clean, the cleanliness will not last long. But the chief danger is not in the least affected by the inquisition and requisitions: the drainage of Florence is abominable; every house has a vast cesspool, the waste-pipes are never trapped, and the cesspools often not cleaned for months, while in many houses the well from which the water-supply is drawn is in the same courtyard as the cesspool, and in some cases, which I know by personal inspection, there is a free drainage into the well. The last winter was more prolific of malarial fevers than any one in the recollection of residents, and the landlords obstinately and universally refuse to make the improvements demanded for health. One European doctor told me that he had fifteen cases of typhoid on his hands at one time, and even Italian physicians were compelled to admit that malarial fever had become a serious element in Florentine existence. There will be no reform till the English and Americans desert the city. We pay a greater death and disease tribute in proportion than the foreign colony of any other Italian city, increasing every winter, and we have no recourse, for there is no sanitary law, and no disposition on the part of the proprietors to expend a franc on improvements by which *forestieri* alone profit. The condition of things is simply scandalous, and there will be no bettering, but the contrary, until the *forestieri* learn that there is more fever in Florence than in any city of its size in Italy, and decide to go elsewhere for their winter's 'health-seeking.'" — *Pall Mall Gazette.*

Solar Motors. — Among the companies recently formed in Paris is a society for the utilization of solar heat, with a capital of 1,600,000 francs. The problem which the patentees profess to have solved is as old as Archimedes, who is said to have set fire with burning-glasses to the Roman fleet, when besieging Syracuse. One hundred years afterward Hero of Alexandria constructed a solar fountain. In 1551 Adam Lonicer adapted solar heat to the process of distillation. In the next century various solar clocks were constructed, and the first hint was given of using the sun as a motive power. The first scientist to turn his attention to sun force as available for practical purposes in the present century was John Herschel, who constructed an apparatus for cooking by the sun's rays. Several Frenchmen continued the experiment, and solar pumps and hot-air machines were patented in France. In 1860 Professor Tyndall in the course of his experiments on lunar radiations constructed a machine of great delicacy. It consisted of a cone-like reflector with a highly sensitive test in the centre, on which all the rays striking the interior of the cone were reflected. In 1871 M. Mouchot adapted the idea to a sun machine and exhibited it to the Academy of Sciences in France in 1877. Twenty thousand francs were granted by the Minister of Public Instruction to enable him to perfect his invention, and in the following year a further subvention was made by the Society for the Advancement of Science. In 1879 M. Abel Pifre took up the subject, and further subventions were made by the Government of Algeria. The company thus formed does not profess to be able to do much in climates such as the north of France or England, but in the south of Europe, in Algeria, India and America it is maintained that the invention will be of great value. In these countries fuel is often scarce, and a motor that will supersede steam produced by furnaces may produce extraordinary results where a cheap motive power is required. It is claimed that sun force is far less variable than wind or water power. In the torrid zone the radiation of the sun remains nearly the same for many months and presents a gratuitous power only waiting to be harnessed by science. For the purposes of irrigation, agricultural machines, mills, etc., also for the rectification of alcohol, distillation of perfumes, production of ice, the distillation of water for drinking, and many other uses requiring a low power cheaply produced, the promoters claim that their invention is valuable. No stokers are necessary nor are explosions possible. All that is required is to keep the machine, like a sun flower, always turned toward the sun. The invention consists of a huge reflector not unlike an inverted umbrella, the interior of which is lined with a high reflecting agent. In the centre of this and occupying the position of the umbrella stick is a standard boiler made of a material highly conductive of heat. This receives the rays from the whole reflector and thus collects sufficient heat to generate steam. In addition to motors the society supplies domestic sun machines which boil water, prepare tea or coffee, grill chops and steaks, fry eggs, and cook other food. Portable machines are made for carrying on horseback which will boil water and serve a dinner on short notice. The company also supplies scientific machines and even furnishes the same power in the shape of a children's toy. Unfortunately machines do not always realize the vivid hopes of their inventors and practical people will doubtless wait awhile before ordering a new solar motor.— *New York Tribune.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

284,993. SASH-HOLDER. — William Abele, Zanesville, O.

284,994. FIRE-ESCAPE. — William O. Avery, Washington, D. C.

284,997. VISE. — James O. Barrett, Erie, Pa.

285,001. WASH-STAND. — Nathan O. Bond, Fairfax, Va.

285,006. ROLLING WINDOW-SCREEN. — Ainsworth Brown, Colorado Springs, Col.

285,017. DIVIDERS.—John H. Crowell, Providence, R. I.

285,023. BURGLAR-ALARM. — Bernard Fay, Pittsburgh, Pa.

285,051. SHINGLE-SAWING MACHINE. — Moise Marcoux, St. Eugène de Grantham, Quebec, Can.

285,076. FIRE-ALARM TELEGRAPH. — Edwin Rogers, Brookline, Mass.

285,079. SASH-BALANCE. — Warren Shumard, Richmond, Ind.

285,087. PROCESS OF AND APPARATUS FOR PRESERVING WOOD BY IMPREGNATION TO GIVEN HEIGHTS. — George S. Valentine, Brooklyn, N. Y.

285,097. AUTOMATIC SAFETY-HATCH FOR ELEVATOR-SHAFTS. — Henry Albert, Newcastle, Cal.

285,104. BLIND. — Michael J. Bird, East Saginaw, Mich.

285,112. PORTABLE CHIMNEY. — Leonard E. Clawson, San Francisco, Cal.

285,120. SPEAKING-TUBE. — E. Neilson Gaillard, New York, N. Y.

285,131. COMPOSITION ROOF. — John F. Hoffman, Cincinnati, O.

285,137. WEATHER-BOARDING GAUGE AND CLAMP. — Samuel A. Kennedy, Xenia, Ill.

285,146. FIRE-EXTINGUISHING APPARATUS.—Hermann Molendo, New York, N. Y.

285,151. PAINT. — Anson L. Munson, Fresno, Cal.

285,156. PNEUMATIC DOOR-CHECK. — T. Nichols Page, Boston, Mass.

285,164. SHINGLING-BRACKET. — Patrick W. Ryan, Marlborough, Mass.

285,179. JOINT FOR EARTHENWARE PIPES.—John S. Tibbals, San Francisco, Cal.

285,180. BACKWATER GATE FOR SEWERS. — John S. Tibbals, San Francisco, Cal.

285,191. WATER-CLOSET VALVE. — Peter White, St. Louis, Mo.

285,197. FIRE-ESCAPE. — Albert R. Yount, Yountsville, Ind.

285,210-211. FASTENER FOR THE MEETING-RAILS OF SASHES. — William H. Bayles, Montclair, N. J.

285,216. SASH-BALANCE. — Edwin Bradshaw, Toronto, Ontario, Can.

285,218. LUMBER FOR WALLS. — James E. Brong and Edward A. Carter, Canisteo, N. Y.

285,230. FIRE-ESCAPE. — Richard Christie, Truro, Nova Scotia, Can.

285,250. FIRE-ESCAPE. — John H. Ford, Toronto, Ontario, Can.

285,270. REFLECTOR. — Julius Jaeger, Rutherford Park, N. J.

285,273. FIRE-ESCAPE LADDER. — Francis E. Josel, Freeport, Ill.

285,282. FIRE-ESCAPE. — Jeremiah Lockwood and John Kivett, Sullivan, Ind.

285,292. HANGER FOR EAVES-TROUGHS. — Theodore McMaster, Sloansville, N. Y.

285,296. FIRE-ESCAPE. — John Moffet, New York, N. Y.

285,301. FIRE-ESCAPE. — James S. Parmenter, Woodstock, Ontario, Can.

285,319. FIRE-ESCAPE. — Joseph Stofflet, Seigfried's Bridge, Pa.

285,334. ELECTRIC BURGLAR-ALARM.—Alvah Wiswall, Cincinnati, O.

285,347. SHUTTER-WORKER. — Russell G. Dudley, Jersey City, N. J.

285,350. PRESERVATIVE COMPOUND. — William S. Fickett, Rochester, N. Y.

285,365. DOOR-BALANCE. — William F. Sexton, Sr., and William F. Sexton, Jr., Toronto, Ontario, Can.

SUMMARY OF THE WEEK.

Baltimore.

CHURCH. — Messrs. J. A. & W. T. Wilson, architects, have prepared plans for a one-st'y, with tower, Baptist church and chapel (colored), 52′ x 102′, to be erected cor. Park Ave. and Howard Streets. It will be built of stone and brick, have a seating capacity of six hundred, and cost $10,000; H. C. Smyser, builder.

DWELLINGS. — William F. Weber, architect, has prepared plans for 18 three-st'y brick buildings, with stone finish, each 18′ x 48′, to be erected on North St., between Townsend and Lanvale Sts., for J. Irvine; cost, $70,000.

Three-st'y brick building, with brownstone finish, 20′ x 67′, to be erected on Huntington Ave., for N Y. Applegarth; cost, $4,500.

STORE AND OFFICE. — Chas. L. Carson, architect, is preparing drawings for Messrs. Gregg & Brother, for a four-st'y brick building, with stone and terra-cotta finish, 46′ x 93′, to be erected cor. Charles and Barnet Streets, and to cost $37,500.

STORE. — Three-st'y brick store-building, with stone and terra-cotta finish, 22′ x 66′, to be erected at No. 61 North Eutaw Street, for Chas. Wattenscheidt; cost, $7,000; W. F. Webster, architect.

BUILDING PERMITS. — Since our last report thirty-three permits have been granted, the more important of which are the following: —

Andrew Kohn, three-st'y brick building, w s Wolfe St., between Gough and Pratt Sts.

Lucy E. Burck, 2 three-st'y brick buildings, s s Lombard St., between Caroline and Spring Sts.

McCoy & Gorter, 4 two-st'y brick buildings, e s Gilmor St., commencing n e cor. Windsor Mill Road.

John Mears, 2 three-st'y brick buildings, n s Eager St., e of McKim St.

L. Swift, four-st'y brick building, in rear of s w cor. Eastern Ave. and Duncan Alley, 45′ x 50′.

Jos. M. Cone, 7 three-st'y brick buildings, s s Harlem Ave., between Fremont and Gilbert Sts.; and 10 three-st'y brick buildings, w s Fremont St., s of Harlem Ave.

Wm. Grecht, two-st'y brick building, 28′ x 100′, n w cor. Sharp and Ostend Sts.

Juliet H. Turner, 4 two-st'y brick buildings, w s Eutaw St., s of Hamburg St.

Wm. Groscup, two-st'y brick stable, s s Rice Alley, e of Arlington Ave.

Jas. D. Hodge, 4 two-st'y brick buildings, s s Randall St., between Light St. and the Park.

Sheep Butchers' and Wool-Pulling Association No. 2, 4 two-st'y brick buildings, e s Boulden Alley, s of Robert St.

S. D. Price, 4 three-st'y brick buildings, n s Chase St., n w cor. Constitution St.

J. J. Harvey, three-st'y and mansard brick building, e s Charles St., between Monument and Madison Sts.

Boston.

OFFICE-BUILDING. — The buildings Nos. 18 and 20 Beacon St., formerly occupied by the Boston University have been demolished, and a new building measuring 40′ x 82′ is now in course of erection. The new building will be six-st'y high, of Longmeadow freestone and terra-cotta, with store in first-st'y, and offices above; Mr. J. P. Lovering is the mason, and L. Greely, the carpenter; Mr. Wm. G. Preston, of Boston, architect; cost, $45,000.

BUILDING PERMITS.— *Wood.*— *Centre St.*, rear 16 and 18, Ward 21, for L. Prang, dwell., 18′ x 32′, one-st'y flat; J. McNamara, builder.

Washington St., near Tremont St., Ward 25, for Frank W. Webber, dwell., 20′ x 40′, two-st'y hip; Mr. Marshall, builder.

Cambridge St., near North Beacon St., Ward 25, for Wm. C. Walker, dwell., 22′ and 32′ x 35′, two-st'y pitch; Daniel O. Connell, builder.

Paris St., near Porter St., Ward 2, for Neal M. Campbell, 2 dwells., 20′ x 30′ and 32′ x 40′, three-st'y flat; John C. Frame, builder.

Washington St., rear Ashland St., Ward 23, for Caroline F. Freeman, stable, 12′ x 15′, one-st'y pitch; W. Doe, builder.

Brooklyn.

CHURCH. — The corner-stone of the Union Congregational Church of New-Lots was laid, cor. Orient and Liberty Aves., last week.

BUILDING PERMITS. — *Fifth Ave.*, n e cor. Pacific St., four-st'y brick store and tenement, felt and gravel roof; cost, $10,000; owner and builder, E. L. Donnellon, 186 President St.; architect, R. Dixon.

Magnolia St., No. 309, w s, 200′ s Irving Ave., 3 two-st'y frame dwells., tin roof; cost, each, $1,800; owner, Samuel P. Banham, on premises; architect, G. B. Colyer; builders, J. Thatcher and G. B. Colyer.

Willoughby Ave., n s, 140′ w Nostrand Ave., 3 two-st'y brownstone front dwells., tin roofs; cost, each, $4,500; owner and builder, David Weild, 358 Gates Ave.

Willoughby Ave., n s, 100′ w Nostrand Ave., 2 two-st'y brownstone front dwells., tin roofs; cost, each, $4,500; owner and builder, Daniel B. Norris, 359 Clifton Pl.

Sixteenth St., s s, 100′ w Fifth Ave., one and two st'y brick hall, etc.; cost, $9,000, owner, South Brooklyn Turn Verein, on premises; architect, C. F. Eisenach.

Hart St., n s, 350′ w Lewis Ave., 10 two-st'y brownstone front dwells., tin roofs; cost, each, $6,000; owner and builder, Thomas Donohue, 133 Stuyvesant Ave.; architect, J. E. Dwyer.

Carlton Ave., e s, 90′ n St. Marks Pl., 2 three-st'y brownstone front dwells., tin roofs; cost, each, $8,000; owner and builder, Jno. Monas, 92 Park Pl.; architect and carpenter, J. J. Gilligan.

Park St., n s, 150′ e Broadway, 2 three-st'y frame stores and tenements, tin roofs; cost, each, $4,000; owner and builder, George Straub, 704 Broadway; architect, T. Engelhardt.

Manjer St., Nos. 189 *to* 195, two-st'y brick church, slated roof; cost, $30,000; owner, the German Evangelical Lutheran St. John's Church, Graham Ave., cor. Ten Eyck St.; architect, T. Engelhardt.

Concord St., No. 136, s s, between Jay and Bridge Sts., four-st'y brick tenement, tin roof; cost, $8,000; owner and architect, E. T. Backhouse, Carlton Ave.; builders, E. T. Rutan and F. K. Schermerhorn.

Fifth St., s s, 187′ 10″ e Sixth Ave., 9 two-st'y brownstone front dwells., tin roofs; cost, each, $8,000; owner and builder, Thos. Donohue, 103 Stuyvesant Ave.; architect, J. E. Dwyer.

Stuyvesant Ave., e s, 20′ n Van Buren St., 5 two-and-one-half-st'y brick dwells., tin roofs; cost, each, $4,500; owner, Wm. Godfrey, 139 Stuyvesant Ave.; builders, M. Kuhn & Co.

Buffalo, N. Y.

CHURCH. — St. James Church, stone, cor. Spring and Livan Sts.; cost, $20,000; architect, A. J. Warner.

HOUSES. — North St., near Delaware Ave., brick, stone, and tile; owner, Mrs. E. F. Metcalfe; architects, McKim, Mead & White; cost, $25,000.

House on Seventh St., near Porter Ave., brick and frame; owner, Geo. H. Lewis; cost, $12,000; architect, James G. Cutler.

PRINTING-OFFICE. — Building for Courier Publishing Co.; owner, Chas. B. McCune, Washington St., near Seneca St.; Silsbee & Marling, architects; cost, $30,000.

ADDITIONS. — Addition to house of B. C. Rumsey, Delaware Ave.; cost, $6,000; architects, Silsbee & Marling.

Addition to factory of M. H. Birge & Sons, cor. Niagara and Maryland Sts.; cost, $1,500; J. G. Cutler, architect.

Chicago.

ADDITION. — E. W. Blatchford & Co. are adding three stories to their shot-tower building, cor. of Clinton and Fulton Sts., to cost $20,000; F. H. Waescher is the architect, and Rossler & Winckler are the builders.

FLATS. — T. V. Wadskier is architect of the three-st'y flats on State St., for C. B. King, to cost $40,000; Geo. Kabell is the builder.

Alfred Smith, architect, planned the four-st'y flats for Wm. M. Hoyt, on East Illinois St.; cost, $16,000: J. G. Deitz, builder.

The flats to be built for B. A. Hills, on West Jackson St., will cost $12,000; Charles C. Miller, architect, and George Lehman, builder.

HOUSES. — Gregory Vigeant is architect of dwell. and stores for D. O. Callaghan, on West Indiana St.; cost, $18,000; builder, A. Kaiser.

Thos. S. Kirkwood will build 2 three-st'y dwells. and stores on Chicago Ave.; cost, $14,000; architect, L. D. Cleaveland.

Furst & Rudolph, architects, planned the dwells. and stores for R. Healy, on Archer Ave., to cost $12,000.

STORE. — Jno. Boddie will build a six-st'y store on Market St., to cost $30,000; the architect is F. Baumann.

TENEMENT-BUILDING. — Frommann & Jebsen are architects of the tenement-building to be built on Cass St., for H. Kalmann, to cost $16,000.

WAREHOUSE. — The seven-st'y warehouse building on Market St., for S. P. Parmly and A. W. Robbins, will cost $60,000. The architect is F. L. Charnley.

BUILDING PERMITS. — H. H. Porter, two-st'y dwell., 272 East Huron St.; cost, $6,000; architects, Cobb & Frost; builders, Clark & Fuller.

J. G. Earle, 10 two-st'y dwells., Eda St., cor. Wabash Ave.; cost, $20,000.

A. Crane, 2 one-st'y stores, 215 and 217 Wabash Ave.; cost, $3,500.

H. Kalmann, three-st'y tenement-building, 212 and 214 Cass St.; cost, $16,000; architects, Frommann & Jepsen; builders, P. Reiplenger & Son.

Emil Schryer, three-st'y and basement dwell., 510 Halsted St.; cost, $5,000; architect, P. W. Reuhl; builder, A. Kaiser.

C. W. Wells, three-st'y dwell., 129 Peoria St.; cost, $5,500; architect and builder, J. W. Cassel.

Geo. H. O'Brien, three-st'y dwell., 319 Wells St.; cost, $5,000; architects, Holabird & Roach.

S. C. McDowell, 2 two-st'y stores and flats, 292 and 294 State St.; cost, $5,000; architect, J. H. Huber.

John Dotka, two-st'y dwell., 514 Ashland Ave.; cost, $5,000; architects, Furst & Rudolph.

Thos. S. Kirkwood, 2 three-st'y stores and dwells., 62 and 64 Chicago Ave.; cost, $14,000; architect, L. D. Cleaveland.

Wm. M. Hoyt, 2 four-st'y flats, 240 East Illinois St.; cost, $16,000; architect, A. Smith; builder, J. G. Deitz.

R. Seedorf, two-st'y flats, 3009 Wentworth Ave.; cost, $4,000.

St. Peter's German Lutheran Church, brick basement, 366 West Chicago Ave.; cost, $6,000; architects, Furst & Rudolph; builder, Chas. Meister.

Paul Mickelson, three-st'y store and flats, 3710 State St.; cost, $7,500; architect, Wm. Linghurst; builders, Walker & Lorimer.

W. L. Beck, three-st'y store and flats, 3708 State St.; cost, $7,500.

J. A. Sackley, two-st'y dwell., 253 Walnut St.; cost, $3,300.

E. W. Blatchford & Co., three-st'y addition, Clinton St., cor. Fulton St.; cost, $20,000; architect, Waescher; builders, Rossler & Winckler.

B. Pontius, two-st'y dwell., 204 Hudson Ave.; cost, $3,500; architect, A. F. Boos; builder, N. Gerten.

Peter Ray, two-st'y dwell., 166 Emerson Ave.; cost, $3,000.

John Nathan, two-st'y dwell., 152 Maxwell St.; cost, $4,000; architect, P. W. Ruehl; builder, A. Kaiser.

Aug. Mendel, 3 two-st'y stores and dwells., 1498-1502 Milwaukee Ave.; cost, $7,500.

R. Healy, 2 four-st'y stores and dwells., 2800 and 2802 Archer Ave.; cost, $12,000; architects, Furst & Rudolph; builder, M. McCarthy.

D. O. Callaghan, three-st'y store and dwell., 630 and 632 West Indiana St.; cost, $18,000; architect, G. Vigeant; builder, A. Kaiser.

H. Heintz, two-st'y and basement dwell., 304 Loomis St.; cost, $3,600.

C. Kaub, two-st'y flats, 9 Lane Pl.; cost, $3,000.

A. Walters, addition to store, 722 West Madison St.; cost, $3,000; architect, W. H. Drake; builders, N. P. Nobery & Co.

George L. Frank, cottage, 165 Mohawk St.; cost, $4,000.

N. Patty, three-st'y dwell., 296 Superior St.; cost, $6,000; architect, F. H. Waescher.

Wm. Baker, three-st'y store and dwell., 2888 Archer Ave.; cost, $10,000; architect, P. W. Ruehl; builder, M. J. Hogan.

S. P. Parmly & A. W. Robbins, seven-st'y warehouse, 222 to 228 Market St.; cost, $60,000; architect, F. L. Charnley; builders, Price & Avery.

D. A. Titcomb, two-st'y dwell., 507 Polk St.; cost, $3,500; architect, W. J. B. Hunter; builder, Wm. H. Cameron.

Wm. Gubbins, two-st'y store and dwell., 703 Ogden Ave.; cost, $3,000.

Peter Bentz, two-st'y and basement dwell., 371

Larrabee St.; cost, $5,000; architect, R. F. Boos; builders, Ebertshauser Bros.

B. A. Hills, 2 two-st'y flats, 421 and 423 Jackson St.; cost, $12,000; architect, C. C. Miller; builder, Geo. Lehman.

Jno. Boddie, six-st'y store, 131 and 133 Market St.; cost, $30,000; architect, F. Baumann; builder, E. F. Gobel.

J. McDowell, 2 two-st'y dwells., 2356 and 2358 Dearborn St.; cost, $5,000; architect, S. Nelson; builders, W. & S. Nelson.

C. B. King, three-st'y flats, 171 to 177 State St.; cost, $40,000; architect, T. V. Wadskier; builder, Geo. Kabell.

A. Dressell, two-st'y flats, 681 South Ashland Ave.; cost, $5,000; architect, H. Strippleman; builder, A. Dressell.

Cincinnati.

Apartment-House. — Jos. Smith, Jr., has contracted for a six-st'y building, to be used for flats, on Seventh St., between Elm and Plum Sts., 27' x 200'; cost, about $30,000; Samuel Hannaford, architect; H. E. Holtzinger, builder.

Building Permits. — Epiphany Church, Lane St., between Locust and Oak Sts.; cost, $5,500.

Michael Lloyd, one-st'y brick building, 128 Elm St.; cost, $2,300.

Jos. Lammert, four-st'y brick building, n e cor. Fourth and Smith St.; cost, $5,000.

Procter & Gamble, addition to two-st'y brick building, 746 Central Ave.; cost, $3,500.

Mrs. M. A. Bates, two-st'y brick building, Colerain Pike; cost, $4,000.

Eight permits for repairs; cost, $5,000.

New York.

Building Permits. — *First Ave.*, n w cor. One Hundred and Third St., 4 one-st'y brick tenements, gravel roofs; cost, each, $1,000; owner, John Simon, 136 Christie St.; architect, A. Arctander.

One Hundred and Thirty-sixth St., n s, 225' e Seventh Ave., one-st'y brownstone front church, tinned peak roof; cost, $10,000; owner, Church of the Holy Innocents; architect, F. A. Peterson; builders, Smith & Prodgers.

Eighty-sixth St., s s, 100' w Ave. B, two-st'y brick dwell., tin roof; cost, $3,000; owner, Thomas Tully, 333 East Ninety-second St.; architect, A. B. Ogden.

Second Ave., s w cor. Ninety-eighth St., 4 five-st'y brownstone front tenements, tin roofs; cost, each, $16,000; owner, Henry G. Monarque, 2145 Third Ave.; architect, A. Spence.

Ninety-eighth St., s s, 96' 8'' w Second Ave., 5 five-st'y brownstone front tenements, tin roofs; cost, each, $16,000; owner, etc., same as last.

Eighth Ave., e s, 49' 11'' n One Hundred and Forty-third St., three-st'y frame store and tenement, tin roof; cost, $5,000; owner, Patrick J. O'Brien, One Hundred and Forty-third St., between Seventh and Eighth Aves.; architect, A. Spence.

One Hundred and Seventeenth St., n s, 64' e First Ave., three-st'y brick tenement, tin roof; cost, $7,000; owner, Wm. Austin, Third Ave., s w cor. Thirty-fourth St.; architect, A. Spence.

West Forty-ninth St., No. 534, on rear, five-st'y brick tenement; owner, architect and builder, Phillip Housmann, 522 West Forty-ninth St.

Eighty-eighth St., s s, 110' e Third Ave., 4 five-st'y brick tenements, tin roofs; cost, each, $17,500; owner, Philip Braindor, Ave. B, between Eighty-fourth and Eighty-fifth Sts.; architect, J. Brandt.

Philadelphia.

Cottages. — Six cottages of the Queen Anne style of architecture are being erected by Mr. William Bullock, at Yeadon, which is near Fernwood Station.

Building Permits. — *Uber St.*, above Diamond St., 6 three-st'y dwells., 16' x 56'; E. H. Flood, contractor.

Twenty-second St., cor. Diamond St., three-st'y dwell., 20' x 60'; E. H. Flood, contractor.

Twenty-second St., w s, n of Diamond St., three-st'y dwell., 20' x 50'; E. H. Flood, contractor.

Bowman St., above Thirty-fifth St., two-st'y dwell., 16' x 30'; E. C. Sheppard, contractor.

Broad St., n of Lehigh Ave., stable, 16' x 60'; W. J. Nolan, owner.

Hancock St., e s, s of Norris St., 3 two-st'y dwells., 12' x 35'; A. M. Hoffman, contractor.

Rochelle Ave., n e of Manayunk Ave., three-st'y dwell., 20' x 44'; G. F. Payne & Co., contractors.

Rear of St. James's Church, bet. Front and Second Sts., 2 two-st'y dwells., 15' x 44'; Wilson Milnor, contractor.

Ridge Ave., w of Leiper St., 2 two-st'y dwells., 12' x 36'; Wilson Milnor, contractor.

Washington Ave., n s, e of Twenty-first St., two-st'y storehouse, 45' x 60'; Jno. Robinson, contractor.

Cogshall St., between Lehman and Rittenhouse Sts., 12 two-st'y dwells., 14' x 28'; D. S. McNabb, contractor.

Chestnut St., No, 1015, three-st'y store, 22' x 94'; Thos. Little, contractor.

Thomas St., s s, e of Green St., 3 two-st'y dwells., 17' x 32'; Harrison & Castor, contractors.

Chestnut St., w of Ninth St., rear of Record Building, boiler and press room, 50' x 60'; E. H. Flood, contractor.

Wellington St., s s, e of Kensington Ave., two-st'y dwell., 14' x 40'; Jno. B. Logan, owner.

Willow St. Wharf, ice-house, Knickerbocker Ice Co., owners.

Ninth St., cor. McKean St., 3 two-st'y dwells., 14' x 40'; Jos. Stuckey, owner.

Ninth St., cor. Dauphin St., four-st'y factory building, 128' 6'' x 129'; E. H. Flood, superintendent.

Bainbridge St., n s, w of Eighth St., church building; F. W. Tweed, contractor.

Venango St., s s, bet. Eighth and Ninth Sts., 2 two-st'y dwells., 15' x 45'; J. H. Dorff, contractor.

Garnet St., Nos. 2734–36–38, 3 two-st'y dwells., 12' x 40'; C. McArdle, owner.

Wayne Junction, three-st'y factory, etc., 42' x 100' and 39' x 222'; McCallum, Crease & Sloan, owners.

Sells St., e of Ridge Ave., two-st'y dwell., 18' x 32'; Chas. F. Rambo, contractor.

Sixteenth St., w s, n of Allegheny Ave., two-st'y well., 30' x 35'; T. W. Draper, contractor.

Summit St., e of Ridge Ave., three-st'y dwell., 21' 6'' x 34'; Geo. Gillet, contractor.

Chestnut St., w s, s of Walnut, Manayunk, three-st'y dwell., 18' x 29'; Geo. Gillet, contractor.

Thirty-third St., e s, near Locust St., 8 three-st'y dwells., 17' x 54'; A. Demmitt, owner.

Germantown Ave., s of Susquehanna Ave., three-st'y office, 26' x 42'; H. Brockelhurst, contractor.

Jefferson St., cor. Hamilton St., two-st'y dwell., 15' x 30'; Henry Rowland, contractor.

Twenty-second St., cor. Norris St., two-st'y stable, 23' x 27'; J. S. Steel, contractor.

East Township Line, cor. Gowen Ave., two-st'y stable, 31' x 74'; Townson Bros., contractors.

Highland Ave., 3 three-st'y dwells., 32' x 36'; Townson Bros., contractors.

Neff St., e s, n of Richmond and Salmon St., n s, w of Neff St., 9 two-st'y dwells, 15' x 42'; Jas. Hood, contractor.

Dauphin St., s s, bet. Eleventh and Twelfth Sts., 4 two-st'y dwells., and 2 three-st'y dwells., 15' x 44'; J. A. Beaver.

Haverford St., bet. Sixty-ninth and Seventieth Sts., two-st'y dwell., 16' x 40'; R. C. Dochard, contractor.

Torr St., n s, w of Forty-ninth St., two-st'y dwell., 16' x 46'; R. C. Dochard, contractor.

Haverford St., w of Fifty-fourth St.. two-st'y dwell., 17' x 20'; W. D. Hunkle, contractor.

Sycamore St., cor. Wykcoop St., 2 three-st'y dwells., 15' v 40'; Geo. McNichol, contractor.

Broad St., s of Locust St., two-st'y stable, 35' x 35'; Geo. McNichol, contractor.

Locust St., n s, e of Thirty-ninth St., three-st'y dwell., 42' x 52'; A. A. Catanach, contractor.

St. Louis.

Building Permits. — Forty-four permits have been issued since our last report, fifteen of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

A. Guillier, two-st'y brick dwell.; cost, $3,000; Hermann, builder.

L. Roos, two-st'y brick dwell.; cost, $4,000; H. Ellermann, builder.

Chapman & Moller, two-st'y brick dwell.; cost, $2,700; J. Ferguson, builder.

H. Parker, two-st'y brick dwell.; cost, $3,000; A. Berthe, builder.

M. E. Church, two-st'y brick parsonage; cost, $2,800; Beinke, architect; Sudholde, builder.

C. C. Murphy, 2 adjacent two-st'y brick dwells.; cost, $7,800; C. C. Murphy, builder.

A. Schultheis, two-st'y brick dwell.; cost, $5,000; contract sub-let.

Dr. Alex. B. Shaw, two-st'y brick dwell.; cost, $10,000; C. E. Illsley, architect; Geo. E. Miller, builder.

General Notes.

Albert Lea, Minn. — The trustees of Albert Lea College have appointed Messrs. Abbott, Parker and Brown, a committee to proceed with the excavations for the college. The plans and specifications presented by Mr. Dunnell were practically selected as those to be used in the erection of the building.

Messrs. Brown & Simms have commenced excavoting for the two-st'y brick building, 22' x 70', to be completed this fall.

W. H. Turrell has commenced preparations for a one-st'y brick building, 22' x 40', on the site of his building lately burned.

Preparations will be made this fall by Ranson Bros., Schlender Bros., S. S. Edwards, John Stage, and others, to put up brick buildings on the ground recently cleared by fire.

Amherst, Mass. — The Chi Psi Society of Amherst have broken ground on their lot opposite College Hall for a society building; Bartlett Bros., of Whately, being the contractors.

Attleboro, Mass. — The corner-stone of the Catholic Church was laid September 15.

Bangor, Me. — The Bangor City Government has appropriated $1000 toward the construction of Agricultural Hall at the Eastern Maine Fair Grounds.

Bridgeport, Conn.—P. T. Barnum is erecting a large building, which is to be used as a place for almost every form of amusement. It is to be 202' long, and will contain billiard and reading rooms, a skating-rink, etc.

Bryn Mawr, Pa. — Brick stable for Geo. Vaux, Esq., capacity 5 horses and 4 carriages, plans by Addison Hutton, architect, Philadelphia.

Cambridge, Mass.— The Jefferson Physical Labortory connected with Harvard College, and now in course of erection, will be a brick and stone two-st'y building, measuring 65' x 200'; the engine-house is completely isolated from the main building, and all shafting carried on separate piers to prevent vibration from injuring delicate experiments. Messrs. Shaw & Hunnewell, of Boston, are the architects, and Norcross Brothers, of Boston, contractors.

Far Rockaway, L. I. — Robert B. Hughes intends to build a hotel for summer boarders.

Flushing, N. Y. — Adjutant-General Farnsworth, Chief of Ordnance, and Inspector-General Briggs, have approved the site on Amity St., in the village of Flushing, selected for the Armory of the Seventeenth Separate Company. The property has a frontage of 59 feet on Amity St., runs back 175 feet to Locust St., and was purchased for $3,000 by Queens County. The State will give $12,000 for the building.

Gary, D. T. — C. B. Cook, architect, of Winona, Minn., is building a $4,000 house, for Irving Sibley, of Owatonna.

Green Island, Lake George, N. Y. — Robert Glendenning, Esq., Phila., proposes to erect a cottage, from plans by Wilson Bros. & Co., architects, Philadelphia.

Huron, D. T. — Mr. Chas. B. Cook, of Winona, Minn., is the architect of the new court-house and jail, which is to cost $50,000.

Whitehall, Wis. — Court-house; cost, $20,000; architect; C. B. Cook, Winona, Minn.

Jersey City, N. J.—L. H. Broome has plans for a four-st'y brownstone apartment-house, floor, 25' x 64', to be built on the north-east corner of Wayne St. and Jersey Ave., for Nicholas Lohse; cost, $14-000.

Johnstown, Pa. — Offices for the Gautier Steel Works, two-st'y high, 40' x 60'; plans by Addison Hutton, architect, Philadelphia.

Media, Pa.— The paper mill of J. Howard Lewis is to be rebuilt at once.

Milwaukee, Wis. — Ground is to be broken immediately for 2 frame houses, to cost between $4,000 and $5,000 each, for M. H. Brand and Fred. Johnson on Mitchell Heights.

James Douglas, architect, has let the contract for Dr. Danforth's house, cor. of Van Buren and Division Sts.; cost, $12,000.

Monroe, Wis. — James Douglas, architect, is getting up plans for a hotel, to cost $30,000, which Ludlow, the wealthy banker, is to build here.

Montreal, Can. — The Grand Trunk Railway has offered to build a large central depot here, to cost $1,000,000 provided the city finds the land.

Moosehead Lake, Me.— A stock company is being organized by A. H. Eveleth to build a $25,000 hotel at West Cove.

Patchogue, N. Y. — Mrs. K. L. Gilbert, of New York, is, it is said, to build a hotel and cottages here, at a cost of some $200,000.

Pittsfield, Mass. — Mrs. Zeno Russell has bought a lot on the west side of Bartlett Ave. next to E. T. Slocum's, and Architect Hill is planning a house for her.

Piqua, O.— A new city building is to be built. The lot is 40' x 120', with streets on all sides; the building will cover the entire lot, be three stories high of pressed brick, and will cost about $75,000. The council have adopted the design submitted by W. R. Brown and Chas. Crapsey, joint architects.

Redwood Falls, Minn. — The new public school building, of which the foundation walls are in, will cost at least $15,000.

St. Paul, Minn. — The National German American Bank of St. Paul opened proposals for its new building Sept. 24.

Wilkes Barre, Pa. — The corner-stone of the Methodist Episcopal Church, to be built on Franklin St., was laid last week.

Winona, Minn.—Mr. Charles B. Cook, architect, has the following in hand: —

The Harvester Works buildings in the First Ward, to cost $45,000.

Mrs. F. A. Smith's frame dwelling-house on East Broadway, $9,000.

J. Ferd. Pudor's frame dwelling-house on West Broadway, $6,000.

John Loshe, brick residence on East Fifth St; cost, $3,000.

Bids and Contracts.

Cincinnati. — The following is a synopsis of bids for iron stairs for the Custom-House, etc., at Cincinnati, O.

The Snead & Co. Iron Works, $7,148 (*accepted*).
The Phœnix Iron Co., Trenton, $7,462.
Joseph Hall & Co., $7,654.
Haugh, Ketcham & Co., $7,961.12.
Scherpe & Koken, $8,560.
McHose & Lyon, $9,000.
M. Clements, $7,885, informal.

Furniture for U. S. Public Buildings. — The following are the successful bidders for furniture, for the public buildings at Philadelphia and other cities: —

Robert Mitchell Furniture Company:
Philadelphia, $20,496 and $10,093.50.
Charleston, W. Va., $5,391.82.
Indianapolis, Ind., $97.
Chicago, Ill., $3,234.75.
Dubuque, Io., $2,375.52.
Cincinnati, O., $255.25.

United States buildings east of Rocky Mountains, tables 1b., letter-presses, desks, office chairs, portable broom-racks, and revolving stools, $810.50.

Melior, Lingeman & Co., New York:
New York, $270.50.
Atlanta, Ga., $200.

United States buildings east of Rocky Mountains, file cases No. 10, and wash-stands, No. 11, $1,328.

Middletown Furniture Company, Middletown, Pa.:
New Orleans, $228.40.
Petersburg, Va., $604.54.
Barge-office, New York, $160.30.
Boston, Mass., $966.

A. H. Andrews & Co., Chicago, Ill.:
Wheeling, W. Va., $215.
Newark, N. J., $70.

United States buildings east of Rocky Mountains, table desks, 1a, tables, 2 and 3; water-cooler stands, 4; desks, 6; revolving stools, 23, and congressional chairs, $1,442.26.

Stotz, Woltz & Co., Chicago, Ill.:
Sub-treasury, New York, $54.

Safes and Vaults for Treasury Department.— The following is an abstract of the bids received for safes and vaults for the United States Treasury Department, opened September 13, 1883: —

Safes.—Double steel-lined, burglar-proof, per foot, inside face measurement, Hall Safe and Lock Company, $16.75; Geo. L. Damon, $7.75.

Single steel-lined, burglar-proof, per foot, inside face measurement, Hall Safe and Lock Company, $10.50; George L. Damon, $6.75.

Double steel-lined, burglar-and-fire-proof, per foot, inside face measurement, Hall Safe and Lock Company, $21; George L. Damon, $10.25.

Single steel-lined, burglar-and-fire-proof, per foot, inside face measurement, Hall Safe and Lock Company, $15.25; George L. Damon, $10.

Vaults. — *Fixed in Place.* — Double steel-lined, per foot, Hall Safe and Lock Company, $14.75; George L. Damon, $7.75.

Single steel-lined, per foot, Hall Safe and Lock Company, $10; George L. Damon, $4.70.

Fire-proof doors, fixed in place, Hall Safe and Lock Company, $245; George L. Damon, $180.

The contract has been awarded to Geo. L. Damon.

South Chicago, Ill. — The contract for the Taylor School building in South Chicago has been awarded to Roehr & Duggan. The bids on the Colehour school-house all being above $10,000 were rejected and the architect was requested to reduce the plans.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

AFTER spending several millions of dollars in constructing an immense intercepting sewer to carry the drainage of their city to the ocean, some of the people of Boston seem to be inclined to doubt the wisdom of the whole proceeding, and the *Transcript*, one of the most influential as well as conservative journals in the city, publishes an editorial calling attention to the rapid spread of the practice of sewage disposal by irrigation in Europe, and suggesting that it might be practicable and desirable to utilize the drainage matters discharged from the new sewer by irrigating some of the barren islands in the neighborhood of its outfall. It is not unlikely that something of the kind may be necessary in future, to judge from experiments made a few years ago, which showed that chips of wood thrown into the harbor at the intended sewer outfall were in a great part carried back and deposited on the shore of an inlet which washes one of the most beautiful and popular suburbs, but for the present it may be regarded as certain that no application of the modern system will be attempted in Boston, or indeed in any of our large seaboard cities.

THE fact seems to be that the trial of a system of sewage irrigation on so large a scale as would be necessary for disposing of the wastes of a great city appears to our engineers too formidable an undertaking to be attempted in the present state of knowledge on the subject; and while all understand the advantages which that method presents in theory, most of them probably know also something of the failures and disappointments which have befallen their brethren across the water, and prefer not to risk their own reputations in connection with what might prove a most disastrous enterprise. At the same time, the undoubted fact that Boston has just paid four or five million dollars for a tube through which to throw eight hundred thousand dollars worth of fertilizing matters every year into the sea certainly offers material for serious reflection; and although it is true that no method has yet been discovered for recovering the whole of the valuable ingredients in sewage so greatly diluted as that of our modern cities, this does not make it any less to be regretted that so vast a sum should be annually thrown away, without the slightest benefit to any person whatever, and perhaps with much future injury to the commerce and health of the city.

EVERY one can understand the reluctance of an engineer, entrusted with the expenditure of public money, to try experiments which, to judge from the results thus far obtained elsewhere, would be more than likely to involve extraordinary expenses for maintenance, and perhaps total failure, but it is on that very account all the more desirable that trials at a small scale, which will point out the way for more extensive operations, should be encouraged in every possible way. There would be no harm, for instance, but great benefit, in setting aside, in such towns as Boston, New York or Philadelphia, experimental tracts in the city parks, where the most efficient and least offensive methods of applying sewage as a fertilizing agent to land could be studied, and observations made to determine the kind of crops best suited for cultivation under such circumstances, with the details of their management. No one can read the accounts of the English and French sewage-farming without feeling the lack of scientific study of these points. In nearly all cases, the municipal engineers seem to have made the best contract they could for getting rid of the sewage, and then to have turned the flood of drainage over the tract specified in the contract, without troubling themselves further about what became of it, while the unfortunate lessees or managers of the sewage farm, overwhelmed every day with a foul inundation which must be disposed of in some way, seem also to have been compelled, for want of opportunity to try anything else, to limit their experiments to a small range of crops, not perhaps the most profitable in the end, but the most available for their immediate and pressing needs. In addition to these investigations, which, in view of the variations of climate and circumstances in different States, ought to be carried on simultaneously in all our large cities, a large amount of most valuable information might be gained by encouraging private individuals to make experiments on their own grounds in growing crops by sewage fertilization on a very limited scale. Every householder who owns a cesspool and a cheap pump, or even a bucket tied to a rope, has all the materials for making observations of the greatest value. The amount of cesspool or sewer liquid that a given plant will bear; the length of time that elapses before the smell of the sewage disappears in various soils; the depth to which the roots of different crops will penetrate in search of the fertilizing stream; the comparative effect in promoting the growth of certain crops of surface or sub-surface irrigation, or a combination of both, as well as the amount of sewage purified in each way; the best plan for subsoil drainage of irrigated land; the behavior of plants in winter in gardens irrigated above or below the surface, or both; the effect of the warm soakage about the roots in enabling plants to resist the winter's cold; the comparative utility, both in respect to the purification of the sewage and the growth of the plants, of intermittent or continuous irrigation, both above and below the surface; together with the character of the peculiar insects, if any, which might be found to be attracted to the sewage-fed crops, would all form subjects of the greatest interest and importance, upon which the humblest might contribute valuable information, while every one, rich or poor, farmer, gardener or amateur, would have something new and interesting to tell. The horticultural and agricultural societies, or, still better, the town and village improvement societies now so common, might, with much advantage, offer premiums for the best specimens of sewage-manured gardens, as well as for accounts of careful experiments of the kind, and the public authority could second the good work by the regular distribution, to all who wished them, of printed slips containing reports from the experts employed in the official investigations. In this way, together with the appreciation of the loss which the community sustains in the waste of sewage manure, would come the practical knowledge and experience necessary for using it successfully, and, this once gained, the utilization of the liquid refuse of the largest cities would become a mere matter of detail.

A CORRESPONDENT of *La Semaine des Constructeurs* asks in that journal for advice in regard to certain troubles which have befallen him, these bearing, by the way, a strong resemblance to the afflictions which beset the path of architects in this country who seek employment in public work. *La Semaine's* correspondent, as it seems, was commissioned by the municipality of a certain town to prepare designs for a group of schools and a *mairie*. He made the drawings, but before the time came for carrying them into execution a political overturn occurred, the complexion of the majority in the municipal council was changed, and the task of carrying out the town buildings was entrusted to another architect. The one first employed then bethought himself of a duty too long neglected, and sent in his bill, only to have it rejected by the new council, and a trifling sum offered him as full compensation for his services. This proving unsatisfactory, and the new council being indisposed to do anything more, the claim was referred to the prefectoral council. Meanwhile the new architect went on with his work, and in due course the plans were

completed and thrown open for estimates. The deposed architect had then an opportunity to examine the design of his successor, and found it a reproduction of his own.

UNDER these circumstances the question occurred to him which, finding it insoluble by his own resources, he propounds to the editor of *La Semaine*, namely, whether the payment of his bill, or of any less sum, by the town authorities, would give them the right to have his design copied and carried into execution by another person. The response of the legal editor of the journal is worth noting. In his opinion, the municipal council was entitled, at its discretion, to procure sketches for its buildings from any architect it saw fit, without going farther with him; on the ground that a principal may terminate the service of his agent at pleasure; and in this case nothing more would be due than the usual one and one-half per cent on the proposed cost. In regard to the theft, as some would call it, of the first architect's plan, for the purpose of having it carried into effect by another, the editor believes that the council, whatever might be said of the honorable feeling displayed in such a proceeding, only acted within its legal rights, and the aggrieved correspondent, in order to recover any compensation for what was certainly discourteous treatment, must show that he had suffered real injury, or loss of reputation on account of it.

THE *Sanitary Engineer* quotes from the Fort Wayne *Journal of the Medical Sciences* some singular information in regard to ventilation, from which, among other things, we learn that "an open fire-flue is the most efficient outlet that can be devised," and that if an inlet is made for "pure cold air by an opening directed upward behind the stove, and above the heads of the occupants of the room," "all cold draughts will be avoided, the pure cold air will mingle immediately with the impure air near the ceiling, and the room will be equably and economically warmed and efficiently ventilated." "June air," the account goes on to say, "may be had in January, and the children will be as merry and rosy as the street children, who have nothing but oxygen to make them so." We are glad to think that the street children of Fort Wayne are so "merry and rosy" as to make them worthy of being mentioned as examples of the good effect of oxygen on the system, but we cannot agree with the opinion that the flue of an open fireplace is "the most efficient outlet for foul air that can be devised." On the contrary, so far as our experience goes, the ventilation afforded by an open fireplace without a fire in it is generally of very small value, and so far from such a flue acting to draw down the impure air from the top of the room, it is usually found that if any upward current at all exists in it, the air to supply it is drawn across the floor from the nearest door, leaving the great mass of the atmosphere in the apartment practically stagnant. The account given of the course of the fresh air currents in the room described as worthy of imitation seems to be also quite imaginary. Why "pure cold air" admitted behind a stove should rise immediately to the ceiling, instead of falling, like other cold air, is not very evident, and even if it should do so, it does not appear why the mingling of this "pure cold air" with "the impure air near the ceiling" should give rise to "June air," or should result in "equable and economical" warming of the room beneath. The fact is that the proper ventilation, even of a small room, is a matter for intelligent and careful study, not for cheap recipes and exhilarating allusions to "June air" and "merry and rosy children." No one has yet learned how to make the atmosphere of living rooms, however well provided with flues, entirely suitable for respiration, and no system of ventilation hitherto devised can take the place of open windows. Of course, when open windows are out of the question, artificial ventilation must be resorted to, but successful artificial ventilation does not consist in mixing "pure and impure air," or in "economical" devices for imposing upon the imagination.

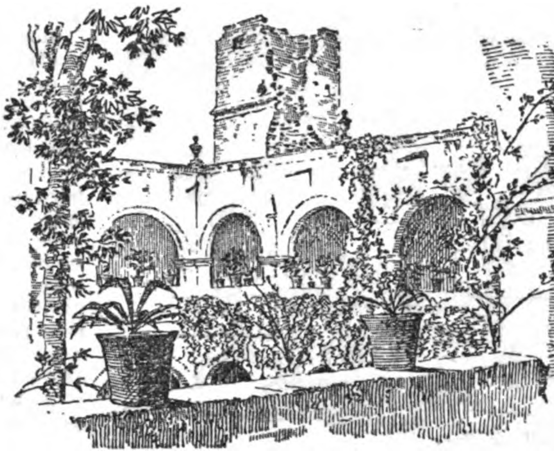
THAT bright little paper called *Indoors and Outdoors* tells a remarkable story in illustration of the fastidiousness in sanitary matters which prevails in Texas. It seems that a public well in Brownsville, the court-house town of Cameron County, in that State, was recently cleaned out, and in it were found the remains of what had once been a human being. Some one, probably a new-comer in the Southwest, took an interest in the circumstance, and ascertained on inquiry that a prisoner in the neighboring jail had disappeared several years before, leaving no trace to indicate the fate which had befallen him. Shortly after the loss of this gentleman to society it was remembered that the water of the well in question acquired a singular taste, and for some time afterward hairs and bits of flesh were drawn up in the bucket, but the people who used the well supposed that these were merely fragments of drowned cats or rats, and continued to drink the water as usual. By and by the bad taste disappeared, and if some innovator had not rudely disturbed the rest of the deceased individual in the well, he might have been entirely consumed by his brethren above ground without their knowledge.

THE *Scientific American* quotes from the *Electrician* an account of a new claim put forward to secure the honor of inventing the electric telephone to a certain Charles Bourseul, a soldier in the French army in Algeria, who in 1854, twenty-two years before the issue of the famous patent to Alexander Graham Bell, communicated to the French Academy a paper describing the Bell telephone precisely as it now exists. Bourseul seems never to have carried his idea into execution, and it is quite probable that as the circumstances of his profession and situation would naturally preclude him from making experiments for himself, he made the suggestion in as public a manner as he could, hoping that others, with better means, might be disposed to test his invention practically. In his communication, which seems to have had a wide currency at that time, Bourseul explained that "if a metal disk could be invented which would be flexible enough to reproduce all the sound waves transmitted to it by the air, and if that disk could be connected to an electric circuit in such a way that in conformity with the vibration of the air it would start and interrupt the current, then it would also be possible to cause a similarly constructed metal disk, in electrical connection with the first, to repeat all the movements of it, and the effect would be the same as if one had spoken directly against this second disk; that is to say, the ear would be affected in the same manner as if it heard the speech directly through the first metal diaphragm." It would be difficult to describe the Bell telephone in terms more accurate than this, and if the story of the *Electrician* is correct, it certainly seems that, although the practical devices for carrying Bourseul's ideas into effect are undoubtedly due to Professor Bell's ingenuity, the decision made in his favor in a certain court, by which he was declared to be the original inventor of the electrical transmission of speech, ought to be materially modified.

IT seems from a letter in *Le Technologiste* that the work upon the canal across the Isthmus of Corinth is progressing rapidly. Two enormous dredges have been for some time in operation at the ends of the line, and others are in process of construction, which will be at work within a few months. Breakwaters have also been built for improving the harbors of Corinth and Isthmia, which form the terminations of the canal, and houses have been erected for the occupancy of the workmen, as well as workshops, in which will be constructed the rough boats for transporting earth and dredged material. So far, only about a mile and a half of the actual canal has been partially excavated, but more than fifteen hundred men are now busily employed, and the number increases every day, so that as soon as the terminal works are completed the excavation will be vigorously pushed.

THE *Manufacturer and Builder* gives a simple process for preparing the luminous paint now coming slowly into use. The ingredients of the mixture are simply sulphur and lime, the latter being obtained from oyster shells, which are to be washed with warm water, and calcined for half an hour, then allowed to cool, pulverized, and the white portions separated from the gray refuse. The white lime is then to be put in a crucible, in alternate layers with flour of sulphur, and the cover luted on with a mixture of clay and sand, moistened with beer. The crucible is exposed to a bright flame for an hour, and is then, after cooling, broken open, when the contents will be found of a mottled white and gray color. The gray portions are to be separated and thrown away, but the white part is to be finely ground and sifted through muslin, after which it may be mixed with varnish, oil or size, and used like ordinary paint. It is essential that objects painted with this substance, which are intended to be luminous at night, should be exposed to sunshine or bright light during the day. If so treated the paint will retain its qualities indefinitely.

STROLLS ABOUT MEXICO.



Cloisters and Ruined Tower, Coyoacan, Mexico.

If one wishes to keep in good health in the City of Mexico he should, besides taking a daily constitutional in the Alemeda, or out on the Paseo, at least one day in seven breathe the fresh air of some of the foot-hill suburbs. He thus holds typhoid fever at bay, the spongy soil and defective drainage of the Aztec capital making that disease as common as at Munich, and but for the perfect climate and great altitude, Mexico would probably be one of the unhealthiest cities in the world. But those people who take plenty of pure oxygen may reckon themselves safe, for it is noticed that it is generally those who keep close to their houses who are the sufferers.

The other Sunday I joined some Mexican friends in an excursion to one of the minor suburbs, the village of Coyoacan, about half-a-mile from the battle-field of Churubusco, to the southward of the city. The street-cars of the Federal District Railway Company run to the suburbs in "trains," so-called, at intervals varying from fifteen to ninety minutes, according to the importance of the respective points. Several cars start at once for the same place, making a train of one or two first-class, and two or three second-class cars, the first being like our own street-cars in the American cities, and the second, distinguished by a dark and gloomy green hue, being generally noisy and provided with half-darkened windows, so that economically inclined respectable persons would hardly feel like patronizing them, although the rates are about half those charged for first-class passage. On Sundays the trains are larger, on account of the many excursionists and Sunday visitors in town and out. Once beyond the city limits the pair of mules attached to each car take a pace so lively as to give one a new idea of street-car speed, and, indeed, the running time in the city itself is much faster than in our American cities. The track itself is substantially built, with heavy rails of steam-railway pattern and bolted together in the same style, making a strikingly easy roadway. The cars not being heavy, however, the sleepers are laid pretty far apart. The causeway leads out through green, marshy pastures, partially flooded by the heavy rains of this season, until at last the ground gets higher and dryer and corn-fields line the way, the maize planted remarkably close and showing all stages of growth from the sprouting blades to fields nearly ready for harvest. At Churubusco station a branch railway leaves the Tlalpam line for the charming suburbs of San Angel, the Brookline of Mexico. The scarcity of vehicles in the country is shown by the line of this branch, which takes up the whole of the narrow way, leaving only a small foot-path by its side as it runs between the maguey hedges. The old church of Churubusco, around which the battle was fought with the victorious Americans in 1847, stands alone in the level fields not far away.

The parochial church of Coyoacan, with its interesting tower and the rambling structures attached, appeared most picturesquely at the end of our lane-like way, lined with orchards and market gardens. The quiet, grass-grown village plaza was as restful and shady as an old-fashioned New England village green. Beneath the tall ash-trees of the low-walled central enclosure a few perennially flowering geraniums and other shrubs bloomed modestly and cheerfully. On one side stood the church, on the other the public building of the village with the office of the justice of the peace, — whose office could hardly be an arduous one, judging by the aspect of the place, — side by side with the village school. The church was the attractive point of the place and, leaving our picnic-baskets at the house of a friend of one of our party, close by, we repaired thither. I thought, at first sight of the church, that from the extent of the attached structures it must have been an adjunct to a monastery or convent, and my inference proved correct, for I learned that it was formerly the home of a Dominican brotherhood. It was now nearly a ruin and only a small portion of it was in use.

The underlying Romanesque motive of the Jesuit baroque and rococo styles that prevails in substantially all ecclesiastical architecture in Mexico is often apparent in features of much symmetry, dignity and beauty, laden, as it too often is, with masses of meaningless frippery, though frequently an exuberance of ornamentation is so joined to fine proportion that it but gives a picturesque quaintness to the naïveté of its design. A new-comer is apt to be impressed with a monotony in the churches of Mexico, but although they mostly follow one general plan, an observing eye soon learns to detect marked differences. Though but a layman, a passionate love for the most popular of the formative arts makes for me the noting of these individual variations one of the greatest charms of my various excursions about this interesting country.

The Romanesqueness of this old church and cloister of Coyoacan is very apparent, both in the massive double tier of round arches of the cloister, and in the form of the church itself, which is a decided basilica. The church, as in many of the rural towns, faces a spacious, walled yard, entered through arched portals. We went into the building through the cloister-ways, and the enclosed garden had a beauty so quaint and by-gone-age-like that I desired to photograph it, and one of our party hastened to find the *padre* to get his permission. A fence of high slats shut the court off from the cloister-passages and a hedge of the tallest geraniums I had ever seen rose almost as high as the massive arches. A giant *fresno* or ash, rose in the centre of the enclosure, which contained a profusion of roses, forget-me-nots and other flowers blooming under a tropical luxuriance of plantains. Neatly kept paths coursed through this pretty epitome of perpetual June. The evident gem of the place in its keeper's heart was a dainty little stone pile about two feet high, with grottos, in one of which was a figure of a wild man and in another a representation of the modern legend of Our Lady of Lourdes, a tiny porcelain Virgin transfigured before a tiny porcelain shepherdess. The arched walls were whitewashed but time-stained, and thickets of vines clambered over them to the roof, one of them starry with red trumpet flowers among its glossy dark leaves. On the parapet of the second story, between every arch, were ranged large flower-pots filled with gorgeous blooming plants, highly-decorative, and along the parapet of the roof were ancient terra-cotta urns. The whole place seemed like a picture from one of William Morris's poems.

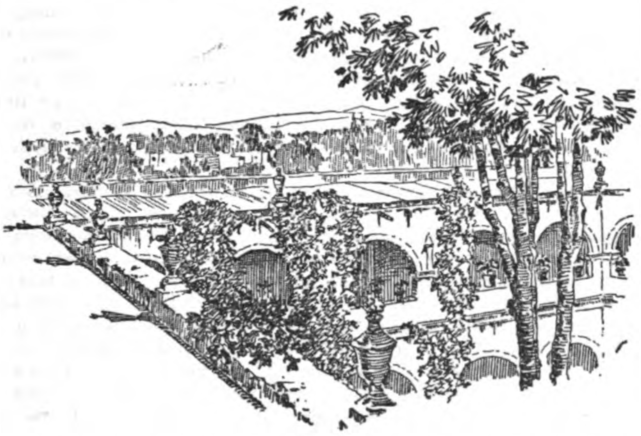
The *padre* came, (the village curate he was,) with an ascetic, but gentle and refined face, like a man accustomed to simple ways, and pure thoughts. His courtesy was exquisite: with the greatest of pleasure he would grant our request, but would we not first like to look at his chapel? And he led the way through a passage through the church, now bare, whitewashed and dilapidated, to the chapel which occupied the north transept, now about the only part of the church utilized, the main body evidently being used only on rare feast days. There was no dome over the union of the nave, transept and choir as in most Mexican churches, but this chapel had a smaller dome of its own; a rather unusual feature. The chapel was kept in perfect order, and it was evidently dear to its master's heart, for the dark eyes of the *señor cura* gleamed with pleasure when I said that I would photograph it, and he had the tall candles lit before the gilded altar with its garland of paper roses, and he sent out for some people, who, when they came, knelt at his bidding, while he and his sacristan knelt on the altar steps. The sky was overcast and the interior light was not strong. I used an instantaneous plate, but it needed considerable exposure in that light, and I strolled away for ten minutes through the church and passages, pausing here and there to note a bit of decoration which the whitewash-brush had spared. Around one low, round-arched door in an ante-room the stone carving, in rosettes and twisted ornamentation, was painted in brilliant colors, orange and red predominant, and on the landing of a stone stairway there was left a strip of the frieze ornamentation, a beautiful design in black-and-white tracery, with well-drawn outline figures, probably the work of some artist Dominican. The walls of the whole building must have been very beautiful in the old times, for they had all been decorated elaborately, the curate told us.

When I returned to the chapel the kneelers were as still as statues, and the excellent negative which the plate turned out to contain the next evening showed that they had not stirred a hair's breadth. But one of our friends rubbed his knees as he arose and remarked that it had been a long time.

The curate then showed us around the spacious structure. In one corner of the cloister-way a section of the ancient decoration was left, and very rich the effect of the whole passage must have been. The space was divided off into small squares, and each square was filled with little reliefs, carved in wood, representing saints, angels, and other sacred subjects, quaintly conceived, and each square different in design. The whole was profusely gilded and painted in brilliant colors. The work was over three hundred years old, so the curate assured us, and the whole cloister-way had been thus decorated. It was a pity that it was ever destroyed, I observed, and one of our party remarked that the *señor Americano* had a liking for these relics of the ancient time; "And I too," said the curate in a tone of gentle reverence, as he looked regretfully up at the bare, whitewashed ceiling.

The farther part of the building was in total ruin: the flat roofs had fallen in and the walls were tumbling. We went up a broad stone stairway and entered the cloister gallery of the second story, cheerful with its blooming plants, the massive stone arches embowered by clambering vines, and on the walls hung several large and old paintings. The curate's rooms adjoined the gallery and he invited us in to rest. The rooms were spacious and airy; barely furnished but exquisitely cleanly. There were several old paintings on the wall, correctly drawn but most of the commonplace character of the average

sacred composition. Whether of Spanish origin or of the old Mexican school it was impossible to tell, so closely does the latter follow the former. One painting, however, was an exception to the rest. It was a St. Hieronymus, and the enraptured countenance and inspired eyes betrayed the touch of a master. The curate said that it was believed to be a Murillo, and very likely it was, for there are a number of works by Murillo and the great Spanish masters in Mexico. It struck me, however, that the color was a little too positive and strong for Murillo.



We went to the roof, whence there was a charming look down into the cloister court, the luxuriant leafage clambering up the walls and over the parapet with its terra-cotta urns. There were also noble vistas across the fertile valley robed with its summer green and margined by some of the grandest mountains in the world.

As we came away the curate presented us with two bottles of *vino de Membrillo*, or quince wine, and gave us each souvenirs of his garden in the shape of lovely bouquets, arranged by Manuel, the sacristan, with the fine taste for flowers which distinguishes the Indians of the country. We paused to say farewell to the good father at a point in the gallery where there was a view of a ruined tower beyond, supported, as it were, by the line of gracefully strong cloister arches, with their cool, deep shadows, and framed in by the archway beneath which we stood.

It was then lunch time and we repaired to the house of our friend, who was a chicken fancier, and had in his parlor five lusty game-cocks tied by strings attached to one leg, along the wall beside nearly every chair. As the floor was of brick tile, their clutter mattered little. In the back yard was the cockpit. The table was spread in the passageway in the centre of the house, and beside the fare we had brought from the city there were the national *tortillas* and *chile*, besides a most palatable soup and the *frijoles*, or beans, common to every Mexican table. To one satiated with the rather tough fresh French rolls of the city restaurants, the *tortillas*, made of corn-meal, were a welcome change, and with the peculiar fruit called *aguacate*, which is soft and butter-like, spread over one of the flat cakes and then folded into an omelette-like roll, it was really delicious. Many of the Mexican fruits have a most deceptive cooked flavor in their natural state. The *aguacate* seems like a cooked vegetable; the *mamey*, its substance of a dark terra-cotta red, tastes like ready-made pumpkin pie, and the *cherimoya*, or custard apple, is like a delicious ice-cream. Of the latter there is a saying:

> "Hay dos cosas en la vida
> Que se nunca olvida:
> La felizidad y la cherimoya!"

(There are two things in life which one never forgets: happiness and the *cherimoya*.)

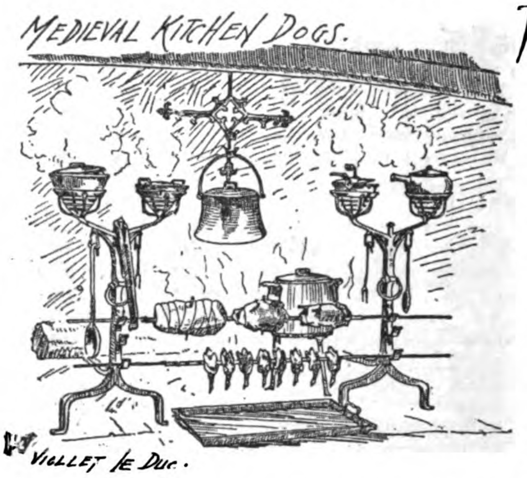
When we were about half-way through our meal the great door was thrown open and two riders appeared — an amiable-looking man and a very small boy mounted all alone on a very large horse. The boy, who was only three years old, seemed doubtful whether he should dismount, or ride in upon us, that being the way to the stable behind the house. The former were decided upon, the horses were tied to trees, and the newcomers joined us, for they were members of the family who had been off for a Sunday-morning ride.

After lunch we strolled through some of the market-gardens of the neighborhood, filled with thickets of fruit-trees, apples and pears, — the former of a miserable quality, like all the apples of Mexico, from lack of proper modern stock — while all around bloomed a wilderness of the loveliest roses, together with other garden flowers, dahlias being particularly common. In one garden a clear rill was flowing out of the pipe of an artesian well, about two feet above the ground, and then running away under the trees in a pretty brook. The proprietors of the gardens all seemed to be Indians, who had a well-to-do and respectable appearance.

As we rolled home over the smooth tramway the two great mountains that preside over the Valley of Mexico, — Popocatepetl and Ixtlaccihuatl, — which in the morning had been veiled with clouds, now lifted in the southeast their snow-crowned heads far up into the heavens.

Sylvester Baxter.

SMOKY CHIMNEYS.



As there can be very few of our readers who have not in one way or another been troubled by smoky chimneys, we give space this week to the setting forth some of the plainest and most sensible words of advice we have seen in regard to their cause, prevention, and cure. The author, Capt. James T. Johnston, R. E., has issued a small shilling pamphlet on the subject, which would discover a remedy in most cases of smoky chimneys for those who read and remember it.

Capt. Johnston believes we shall for a long time hold to our open fireplaces, and therefore limits his remarks to a consideration of those only. The subject is divided under several heads, which we print as below: —

1. Heat expands air or rarefies it.
2. Hot air is lighter or more buoyant than cold air.
3. Smoke is heavier than air until it becomes rarefied.
4. Dry air is heavier than moist air.

It would be quite beside the object of this little work to recommend any particular form or kind of grate, so we will premise that a suitable one has been selected from the number now everywhere obtainable, and whose name is legion, only recommending: —

(1) The plan of the hearth should not be rectangular, but the sides inclined to an angle at the back, as a grate of this form throws out much more heat into the room.

(2) The back and sides should be composed of fire-brick in place of metal, owing to its being a better radiator, as well as an inferior conductor of heat, and to the fact that all heating-apparatus made of cast-iron emit a large quantity of carbonic oxide (CO), which is seriously injurious to health.

Cause 1. A great deal, more than is generally supposed, depends upon the manner in which the grate is set. If it be set too far back into the wall, the greater portion of the heat evolved will escape up the chimney, instead of coming into the room to warm it. If, on the other hand, it be placed too far forward, the smoke, in place of ascending the flue, will find its way into the room. So here, as in most things in life, the happy medium must be hit off. For this no general rule can be laid down, as the number of sizes of grates now manufactured is infinite, and the thickness of the walls of our dwellings varies.

Cause 2. Again, if the arch over the fireplace be too high above the grate, the smoke will have time to cool to a certain extent before it enters the chimney proper, and will consequently descend into the room; for smoke, be it remembered, until it becomes rarefied, is heavier than air. The smoke whilst in this position, too, will be more influenced by the various currents of air that are always circulating around a well-ventilated apartment, and will be liable at any moment to be blown outwards into the room. The cures for this are either: —

(1) To raise the grate, which in some cases would increase the heat thrown out.

(2) To fill up a portion of the space by inserting a second arch under the existing one.

(3) To affix a blower, movable or not, as desired.

Some little care is required in applying any of these three remedies, the result of all of which is practically the same, viz., they compel the fresh cold air to pass through the fire instead of over it, thus warming it and making it more buoyant; and also they cause more oxygen to be supplied to the burning fuel, for, if not carefully adjusted, the fire will be converted into a roaring furnace, nearly all the heat generated by which will be sent up the chimney, at a great increase of the amount of fuel consumed. For an average-sized grate the fireplace opening should be square; for a smaller grate the opening should be higher than it is broad; and for a larger one broader than it is high.

Cause 3. I have met with a case in which everything was to all appearance perfectly satisfactory, but still the smoke could not be persuaded to take the course clearly marked out for it, but would persist in coming into the room in aggravating puffs. I was nearly giving its remedy up as hopeless, thinking, with Artemus Ward, that perhaps the fire only smoked out of "sheer cussedness," when I decided to make one more attempt, and to build up the cheeks so as to meet in a point at the middle of the back. This I did with entire success, and I can only explain the cause of the cure as follows: It is

a fundamental law in natural philosophy that the angle of incidence is equal to the angle of reflection. A direct draught towards a fireplace has a two-fold motion, viz., towards the back of the grate and upwards. Now, suppose a grain of the smoke to be carried by this intermittent two-fold force in the direction of the resultant, it will rebound at nearly the same angle and come into the room. In the altered form of grate it will glance off inwards, and by the time it has made its second impingement, it will have been carried up the chimney. I have since tried this on more than one grate with equal success.

One word as to the back of the fireplace — the portion between the actual cage in which the fuel is burning and the mouth of the flue. Should it be vertical or slightly receding? By all means the latter, as directing the impinging smoke upwards at a greater elevation. But better than either have I found the giving a slight belly to the part immediately above the live coal; the smoke appears to cling to this swelling, and in consequence to ascend closely against the wall.

Cause 4. The last ill-behaved chimney that I came across was one in which everything connected with the grate was satisfactory, the flue was lined with nice glazed earthenware piping of the correct size, and the chimney-top was all that could be desired; *but* the gathering wing had been badly designed with a too sudden gathering over to the flue, which construction did not allow of the smoke entering the flue sufficiently gradually, like wine decanted through a funnel. The effectual remedy adopted was reducing more gradually the size of the mouth of the smoke channel.

The three principal points to be considered with reference to the flue are its shape, size, and length.

First, as regards shape, a circular flue, though requiring more care in its original construction, is to be preferred to a rectangular one, because friction, which tends to retard the free escape of the smoke, is less in one of such form, and if such circular flue be lined with glazed earthenware pipes the construction is simplified, and the friction and deposition of soot are reduced to a minimum, for soot, like other things, will adhere to a surface in proportion to its roughness. A round orifice, too, is more easily cleaned than one which contains angles and corners for the accumulation of soot.

Cause 5. Now as to size, the flue must be proportioned to the fireplace, so as to carry off quickly and readily all the smoke generated by the combustion of the fuel. In one of too small sectional area the smoke will be unable, owing to friction against the sides, and to the particles getting in one another's way, to get away quickly enough, just as in the case of a fluid. The only cure is to take down the flue and rebuild it of the proper size.

Cause 6. If the flue be too large, there is set up in it a descending as well as an ascending current, which is fatal, and further, the pressure of the atmosphere on the top of the flue will overcome the force of the ascending column of smoke, driving it back into the room. A cure may be accomplished in this case by contracting the top of the chimney in a conical form, thus giving to the smoke sufficient velocity to resist the action of the wind. I have said advisedly that this *may* effect a cure, as it will not in the majority of cases do so, when the only alternative is, as in the case of the too small flue, to take it down and rebuild it of the proper size.

Cause 7. And lastly, coming to the question of length, we must bear in mind that the force of the draught up any chimney is always proportionate to the difference of weight between the cold air which feeds the fire and the column of heated air in the flue. If the flue be too short, as may happen more especially in the rooms near the top of a house, the draught will be too slack, and the ascending current will not have sufficient power to force the smoke up. The simplest remedy for this would be to increase the height of the chimney, but this is not always practicable; when this cannot be done, the opening of the flue immediately above the grate, commonly called "the throat," should be contracted by forming a belly on the front side of the flue which will cause the air to ascend more quickly, for the same reason that the velocity of a river is always more rapid at its narrowest points.

I have never yet come across a flue that is too long, though of course there must be a limit even in this direction, else the ascending current of hot air will get cold before it reaches the top, and have a tendency to descend again.

Cause 8. The contraction of a flue of the proper sectional area near its summit is by no means an uncommon cause of a smoky chimney. Only in the winter of last year I came across a case of this kind in the guard-room of the Military Hospital at Stoke (where the men had not only to live for twenty-four hours, ready to turn out smart and clean at a moment's notice, but also to cook their food), which was rendered quite uninhabitable. The flue was very large, being twelve inches square, and on the top had been placed a nine-inch circular chimney-pot. It was of course impossible for a volume of smoke filling the larger orifice to get through the smaller one at the same rate, and the consequence was that the exit of the smoke being choked up above, the flue became filled faster than it could empty itself, and the surplus smoke was bound to escape into the only other outlet, viz., the guard-room. The higher the smoke rises the less is the force that drives it, and the slower it moves, and in consequence, it should, if anything, have more room to move in. I took off the nine-inch pot, and continued the chimney up to the same height as the top of the pot had been, and of the same size as the rest of the flue, with the satisfactory result that the fire burned more brightly than before, and without a particle of smoke finding its way into the room.

Cause 9. A flue should never be built perfectly straight, as such construction in certain situations is quite sufficient to cause a chimney to smoke. It should be constructed with a bend, which is called in the trade "breaking daylight," which prevents the wind blowing vertically down, as also the rain from falling on to the fireplace. The bend should commence some way above the mouth of the flue, so as not to diminish the initial velocity of the ascending current and in some cases more than one bend may be constructed with advantage.

The proper lining of a flue is a necessary point, as assisting the rapid ascent of the smoke. The sides of the flue, as already stated, should be as smooth as possible, so that where earthenware pipes are not used the sides should, in the first place, be built with their surfaces as even as possible, and then either plastered or pargeted, the latter being a paste composed of mortar and cow-dung, in very general use. All angles and sharp turns should be avoided, being rounded off.

All the flues in a house should be gathered into one common stack, as in this way they help to keep each other warm, and so to increase the draughts. Moreover, if possible, all flues should be in the inner walls of a house, as they will thus retain their heat better than if they were in the outer walls, and parting with some of it to the outside air; but this is not a very important point, bricks, stone, and mortar being very inferior conductors. A wall exposed to cold north and east winds is the worst position for a chimney-stack.

A chimney-pot is at any time an unsightly makeshift and a *perfectly unnecessary* adjunct to a properly constructed flue. An architect by adopting it in his design, except for the sake of appearance, merely damns his own flue, and any design dependent for effect on its chimney-pots must be a poor one indeed. Where, however, they are adopted, they should at least be made to serve some useful purpose, and *to direct the wind upwards;* but in walking through the streets, how rare a thing it is to find amongst all the myriad forms and varieties one constructed on this, the only correct principle!

We will now proceed to notice certain causes for which neither the grate, nor the flue, nor the chimney-top can be held responsible.

Cause 10. First, let us take the case most frequently met with of a fire insufficiently supplied with fresh air which contains the oxygen necessary for combustion. If not supplied from a proper source, the fire will draw the necessary supply down the chimney, thus driving the smoke into the room. As a rule, sufficient fresh air enters through the crevices of the doors and windows; but where this is not the case, and the weather is too severe to allow of the opening of a door or window, and all the crevices are hermetically sealed by sand-bags or some other method, an extra supply must be provided, and the simplest means of doing this is to carry a small tube from beneath the grate to the outside of the building. This air-flue may, however, prove a curse instead of a blessing unless a little judgment be exercised in regard to it. It must, in the first place, be of the necessary size to supply the wants of the fire: neither too large nor too small. If too large, the combustion will be so increased as to cause an unnecessary expenditure of fuel; if too small, it will be but an improvement on the original state of things, in place of a cure. The side of the house on which the air is to be introduced must next be considered, for if the air-flue has a warm aspect, such as the south, the air that comes from without will, even in winter, be warmer than that in the room, and what will then happen will be that the air-flue will draw the air down into the room. A damper or some other arrangement for closing the air-flue must be provided, else when the fire is not lighted, the cold external air will blow directly into the room and reduce its temperature, to the discomfort of the occupants.

Cause 11. In a room where two fires are lighted, the room will sometimes be filled with smoke, owing to the precaution of supplying each of the fires with the amount of fresh air necessary for its combustion having been neglected, in which case the stronger fire will overpower the weaker and draw the air it requires down through its flue. The same may also happen even if the two fires be in different rooms and the door between them left open. It is no uncommon thing for a kitchen fire to overpower all the others in a house, and to literally fill the habitation with smoke. The cure for all these cases is the same as that prescribed for the foregoing.

Cause 12. The position of the door of a room with relation to the fireplace is too often overlooked in the designing of our houses. The best position for it is exactly opposite the fireplace.

Cause 13. The case which I have most frequently heard pronounced as incurable is that of a chimney commanded by a higher building, especially a vestry chimney, or of a chimney behind which there is some vertically rising ground, such as a cutting in a rock. The usual rule-of-thumb remedy is to employ a revolving cowl, with which I do not hold for the following reasons: the wind in such positions as those above described, after striking the commanding object, rebounds, and naturally forms an eddy, whirling the cowl, as well as any other light objects within its grasp, round and round with it. The mouth of the cowl must in its turn face towards the gust, when the wind will enter the flue with a screw-like motion, driving the smoke down into the room. Even if an eddy be not formed, a strong wind will keep the mouth of the cowl always turned towards the obstructing object, from which the air will rebound and rush down the open mouth, carrying the smoke along with it. In calm, still weather, a cowl is actually bad. But now, if, instead of affixing a cowl, the flue near its summit be forked, the eddy, never being likely

to enter both orifices with equal force at the same instant, a gust will rush down one and force the smoke out by the other.

Cause 14. A room in which there is no fire burning will sometimes be filled with smoke from an adjacent chimney in use, through the smoke being literally drawn down the unused flue into the room. The most efficient remedy, where feasible, is to increase the distance between the two conflicting chimney-tops; but where this cannot be done, an almost equally beneficial result will be obtained by raising one of the terminations some little height above the other. The placing slates meeting at an angle, or half-pipes over the flues, or simply small vertical divisions between the flue openings, if the flues be in a common stack, are also efficacious and extremely simple. Closing the register above the unused grate should obviate the nuisance during the carrying out of the permanent rectification; but this is not desirable, for as a rule it shuts off the only means of ventilation in the apartment.

Cause 15. A chimney in need of repair, owing to the displacement of a brick or a lump of mortar or other material, will oftentimes injure the draught by obstructing the passage, and if the chimney be cracked, so much the worse, for the cold external air entering the breach will chill the warm ascending smoke and cause it to descend. The cure for these causes is self-evident.

Cause 16. Chimneys are sometimes constructed with a portion of the smoke channel horizontal, which allows the smoke to hang about in it and become cool. The construction of such flues should, where possible, be altered.

Cause 17. We will conclude with a cause the exact converse of No. 13, that of a chimney situated beneath a hill *over* which the wind is blowing, where the air, as it has been so graphically described, "falls like water over a dam." It has not been my good luck to come across a case of this sort, and to try the remedies usually recommended (1) of raising the chimney above the hill, which can in very few cases be practicable, (2) of affixing a cowl, or (3) of making all doors and windows in the side of the house facing the hill. Should I ever be called upon to recommend a cure for such a case, I should adopt experimentally an angular covering, which would, as it were, split the falling air in two like a wedge, and cause it to drag the smoke down out on each side.—*British Architect.*

THE ADHESIVE STRENGTH OF PORTLAND CEMENT.

THE ordinary methods of testing cement refer to its cohesive power only. Briquettes are made, sometimes from neat cement, and sometimes from cement and sand, and after being subject to from seven to twenty-eight days' immersion in water, they are broken by a tensile strain. But it may be argued that, since the principal function of cement is to produce adherence, so as to convert loose or disconnected material into a solid coherent form, that its tensile strength, unless that also be a measure of its adhesive strength, is but a fallacious guide to its constructive value. This is the view taken by Mr. Isaac John Mann, and which was advocated by him in a paper presented to the Institution of Civil Engineers, and selected by them for publication. Reviewing the history of cement making, and the experimental researches connected with it, he came to the conclusion that neither of the above systems of testing is likely to become universal. The test that he prefers shows the adherence of two strips of sawn limestone, or ground plate-glass, held together by a thin layer of Portland cement. The transition from the test of cement mixed with sand to this test is not so abrupt as would appear; in the former a great number of small pieces of stone are used in the form of sand, while in the latter two pieces only are employed, and the test is thus simplified and better defined. The sand test is neither one of cohesion only nor of adhesion, but involves an indeterminate proportion of both.

Cement, as at present received from the manufacturer, consists of a mixture of an almost impalpable powder with coarser particles, the latter being extremely sluggish or inert, and incapable of developing any great cementitious value within the limits of time over which the tests can extend. It can be hardly doubted that the strength of a test-point made with ordinary cement will be influenced by the fortuitous position which the coarse particles occupy, or, in other words, by the proportion of comparatively inert particles that happen to be in direct contact with the cemented surfaces, and hence it is necessary that one of the standard adhesive tests should be made with material from which the inert particles have been removed. Mr. Mann's attention was directed in the first place to discovering the degree of pulverization required to convert the unground clinker into active cement, and to this end he made a large number of experiments. These led to the conclusions that so far as concerns a seven days' test, the particles of cement stopped by a No. 176 sieve developed little or no cementing power during that period, and that even some of the less fine particles might be very deficient in cementitious strength; and that so far as concerns a twenty-eight days' test, the cement of different manufacturers varied in the cementitious strength of the particles stopped by a No. 176 sieve from nothing to twenty pounds per square inch, their strength increasing but slowly in the longer periods, and probably becoming soon exhausted. If any general conclusion can be drawn from the experiments, it would appear to be that the cementing energy of coarse particles develops much more slowly than that of fine particles. The necessity of adopting a high standard of pulverization is also shown. For example, the particles that were sufficiently fine to pass a sieve of 10,600 meshes to the square inch, viz.: No. 103, possessed less than one-fifth of the cementitious value of those passing a sieve of 31,000 meshes per square inch, viz.: No. 176. The average degree of pulverization of ordinary cement is such that 45.6 per cent is stopped by a No. 176 sieve.

The next point requiring investigation was the cementitious strength of the fine particles. For this purpose the finest sieve obtainable was used, No. 176, and the cement was sifted until an inappreciable amount escaped through the meshes. The material was such as would set in forty minutes to five hours in air. At the end of seven days' immersion the average of sixty-two tests showed an adhesive strength of seventy-eight pounds per square inch, and at the end of twenty-eight days thirty-eight tests gave an average result of ninety-three pounds per square inch. The highest figure ever obtained, two hundred and four pounds to the square inch, was after fifteen months had elapsed.

When the cement was not sifted, but tested as received from the manufacturer, the average of the seven days' trial was fifty-seven pounds per square inch, the lowest result being fifty-one pounds and the highest seventy-six pounds. The average strength found by the twenty-eight days' trials was seventy-eight pounds per square inch, the lowest figure being sixty-nine pounds, and the highest one hundred and eight pounds. Estimated by their cohesive strength all the cements were of good quality. As a general conclusion the experiments showed that the cementitious strength of sifted cement was greater than that of unsifted cement by thirty-seven per cent at the end of seven days, twenty per cent at the end of twenty-eight days, and eighteen per cent at the end of thirteen weeks.

The relation, if any, between the cohesive and adhesive, or cementitious strength of neat cement seems to be extremely obscure, as might be anticipated from the fact that the presence of coarse particles within certain limits increases the former but diminishes the latter. The following examples will serve to show that the ordinary seven days' test of cohesive or tensile strength is unreliable as an exponent of the cementitious value.

COMPARISON OF ADHESIVE AND COHESIVE STRENGTH.

No.	Description.	Average Strength in Pounds per sq. inch.	
		Adhesive.	Cohesive.
1	Ordinary cement, age seven days.	59	532
2	Ordinary cement, age seven days.	51	336
3	Fine cement, sifted through No. 176 sieve, age seven days.	94	428
4	Fine cement, sifted through No. 176 sieve, age seven days.	57	345
5	Fine cement, sifted through No. 176 sieve, age seven days.	65	500
6	Fine cement, sifted through No. 176 sieve, age twenty-eight days.	105	500
7	Fine cement, sifted through No. 176 sieve, age twenty-eight days.	109	387
8	Fine cement, sifted through No. 176 sieve, age twenty-eight days.	84	428
9	Fine cement, sifted through No. 176 sieve, age twenty-eight days.	110	309
10	Fine cement, sifted through No. 176 sieve, age twenty-eight days.	85	320

The investigation of the effect of quick and slow setting on the adhesive strength, which is capable of being developed within the limits of time available for ordinary testing purposes, shows that, with one or two exceptions, the quick-setting cement manifested a greater development of adhesive strength than the slow, while in the case of cohesive strength quick setting seemed generally to produce an opposite effect. The time of setting was arrived at by the following means: A vertical steel needle, moving freely in guides, and having a flat point one-sixteenth of an inch in diameter, was loaded so as to weigh one pound. When the pressure of the point made no visible mark on the surface of the gauged cement it was considered to be set. This is approximately the same pressure as that of the finger-nail, but it has the advantage of being more definite and reliable.

The strength of adhesion of Portland cement to different substances varies considerably; the roughness or smoothness of the cemented surfaces does not, however, affect the strength as much as has been supposed. The table on the next page was compiled from experiments made with cement obtained from five leading manufacturers.

STRENGTH OF ADHESION OF PORTLAND CEMENT TO VARIOUS MATERIALS.

Material.	Average Adhesive Strength.				Remarks.
	7 d's.	28 d's.	13 w'ks.	6 m'ths.	
Bridgewater brick	19	..	..	..	Ordinary cement.
" "	24	66	..	..	Sifted through No. 176 sieve.
Slate (Sawn)	49	..	..	..	Ordinary cement.
" "	53	82	..	62	Sifted through No. 176 sieve.
Portland stone	26	50	..	..	Ordinary. Fragments torn out of surface.
" "	29	62	..	55	Sifted through No. 176 sieve. Fragments torn out of surface.
Ground plate-glass	..	102	113	..	Ordinary cement.
" "	..	..	145	..	Sifted through No. 176 sieve.
Plate-iron	23	68	..	..	Ordinary.
" "	44	66	..	..	Sifted through No. 176 sieve.
Sandstone.	..	49	..	..	Ordinary. Fragments torn out of surface.
Polished marble	38	..	..	..	Ordinary cement.
" "	52	71	..	75	Sifted through No. 176 sieve.
" plate-glass	47	40	..	70	Ordinary cement.
" "	55	49	51	..	Sifted through No. 176 sieve.
Granite (chiselled)	41	..	..	..	Ordinary.
" "	78	97	153	..	Sifted through No. 176 sieve.
Limestone (sawn)	57	78	98	..	Ordinary.
" "	78	93	116	..	Sifted through No. 176 sieve.

Total number of tests (omitting those of sawn limestone), 182.

With reference to a standard test the author's investigations and remarks may be summarized as follows: (1) That the cementitious or true value of Portland cement can be best determined by testing its adhesive strength. (2) That the degree of pulverization is probably the only other condition, the practical importance of which will warrant an introduction into the standard system, which should, therefore, include a standard sieve. (3) That a sieve having one hundred and seventy-six meshes to the lineal inch will be found sufficient for all practical purposes. In adopting the adhesive test the usual specification of the quality of English Portland cement requires to be modified to the following effect: "The cement shall be ground so that not more than forty-five per cent shall be stopped by a No. 176 silk sieve, and its average adhesive strength, after twenty-eight days' immersion, shall be as follows: cement passing No. 176 sieve, not less than ninety-five pounds per square inch — cement as supplied for use not less than seventy-five pounds per square inch."

Mr. Mann's researches are most interesting and valuable, and display the perseverance and assiduity which must form the basis of all true scientific theorizing, but whether his new standard test will be able to displace those already in vogue remains to be seen. If the use of Portland cement were comparable to that of mortar, that is, if it were used to effect the union of flat surfaces, subject to transverse or tensile strains, then it would be evident that Mr. Mann's test is the proper one. But a mass of concrete is very different from a brick wall. The surfaces of its units are essentially round, and present points rather than planes of contact to each other. Hence, although it may be perfectly true that when concrete gives way it fails from want of adhesive strength in the cement, rather than cohesive strength, yet it is by no means clear to us that Mr. Mann's method of testing would properly demonstrate the values of different cements under the conditions of actual practice. The connecting bond or film is extremely thin, and it is well known that the value of such a cemented joint largely depends upon the skill of the person making the joint. When two pieces of wood are carefully united by glue the union is often so firm that it is easier to fracture the solid wood than to tear apart the glued junction, but still it is no uncommon sight to see glued articles fall to pieces. The sand or German test probably comes as near reproducing the conditions under which the cement will be used, as can be done in the laboratory, and, if the difficulty of finding a standard sand could be overcome, would present many advantages over the pure cohesive test. Whether Mr. Mann's system becomes the standard of the future or not he has done good service in calling the attention of engineers to the wide difference between the adhesive and cohesive strength of Portland cement.— *Engineering.*

THE ILLUSTRATIONS.

UNITED STATES COURT-HOUSE, DETROIT, MICH. MR. J. G. HILL, SUPERVISING ARCHITECT OF THE TREASURY DEPARTMENT.

COMPETITIVE DESIGN FOR A $3,000-HOUSE SUBMITTED BY "*Domus.*" [NO. 2.]

"'DOMUS' [No. 2] is evidently one of the most practised designers in the competition, his elevation being one of the most architectural in treatment. Note the clever way in which his gable, with its half-timbering, is combined with the large window. The rough-cast, also, is well managed. There is one serious defect, however, in the roof, which has a dangerous valley. This fault is the more to be regretted in that the plan entitles '*Domus*' to one of the first places in the competition. Both above and below economy and convenience find every requirement fulfilled. Wittingly or unwittingly, the author has adopted a device very like a fraud. On his plan a bath-room is shown, with water-closet and bath-tub drawn out; to be sure, 'unfinished' is printed across it, but that is not enough to warn one that the plumbing is practically left out of the estimate, which should include the pantry-sink and a hopper water-closet shown. A perusal of the items of cost shows that $18.50 is all that has been counted upon for the generous amount of plumbing shown on the plans. The furnace might have been left for the owner to furnish, but it is more than misleading to leave out the plumbing in an architect's formal estimate of the cost of a building. The item for painting is quite inadequate, in spite of the well-known name of the painter offered as guaranty." — *Extract from Jury's Report.*

"RICHMOND HILL." MR. A. H. DODD, ARCHITECT, BOSTON, MASS.

BITS FROM THE "BERKSHIRE," CORNER FIFTY-SECOND STREET AND MADISON AVENUE, NEW YORK, N. Y. MR. CARL PFEIFFER, ARCHITECT, NEW YORK, N. Y.

FOR a description of this building see *American Architect* for August 4, 1883.

HOUSE FOR W. DUDLEY FOULKE, ESQ., RICHMOND, IND. MESSRS. GREEN & WICKS, ARCHITECTS, AUBURN, N. Y.

THE $3,000-HOUSE COMPETITION. — XIX.

DESIGN SUBMITTED BY "*Domus.*" [No. 2.]

ADAPTATION for Double House : — The building can be placed close on the side boundary without danger of being overlooked by any adjacent house, the elevation on this side having no windows. With a slight change in the roof, the plan is made suitable for forming one-half of a double house; an arrangement which would considerably reduce the cost.

Area : — The area occupied by the building amounts to 758 square feet.

Heights : — The height of the first story is 9′, and of the second story 8′ from floor to ceiling.

Things not included in Estimate : — The following things, although shown in the drawing, are not included in the cost of the house: the garden gate and fencing; the bath-tub and water-closet on second floor; the inside wood finish of bath-room; the hall stove; the dresser in kitchen and other furniture; the stairs to the attic; the whole of the plastering, wood floors, wood finish, and windows in attic floor.

Digging : — Remove the loam from the site and pile separately. Excavate as required for cellar, for all walls, foundations, piers and drains. Level the cellar bottom for concreting.

Rubble-work : — Cellar walls of the thickness and heights shown, to be rubble-work laid dry up to ground line, chinked and pointed on the inside with cement mortar. The underpinning above ground line to be set in cement mortar and neatly lined.

Brickwork : — Build all chimneys and flues in good merchantable, hard-burned, common brick in mortar.

Chimney-Shafts :— The exposed chimney-shafts to be of same brick with wide joints of red mortar, the top course set and pointed in cement.

Collars and Thimbles : — Build in 5″ collars and thimbles for all rooms having flues; also for halls.

Trimmer Arch Fireplace : — Turn arched hearth to fireplace in dining-room, and face the hearth, jambs, and back, with a good quality of face brick, with neat joints in red mortar.

Tiles : — Set red tile facing to fireplace.

Cellar Floor : — The cellar bottom is to be grouted with concrete 2″ thick, composed of hydraulic cement and coarse gravel.

Furnace and Registers : — Provide for setting a No. 1 portable furnace. The hot-air will be taken from it to registers in dining-room, parlor, hall, and bedrooms. Hot-air pipes of heavy tin.

Framing : — The frame is to be of the best straight-edged spruce. The floor joists are to be properly crowned and bridged. Headers and trimmers to be framed in best manner and well pinned. Make sufficient transverse ties across the building at the floors. Use all iron bolts and straps required to make strong and substantial work.

Boarding : — Cover the walls for shingling, and roofs with sound hemlock boards.

Clapboards : — The only portion to be clapboarded is that forming back of piazza, which is to be covered with pine clapboards, laid 4½″ to the weather. Use tarred paper or felting around door and window openings and corner boards.

Shingling on Walls : — Such parts of the walls as are shown or marked on elevations, are to be covered with plain, sawed pine or cedar shingles.

Roof Shingles : — The roofs are to be covered with shaved cedar shingles, put on with galvanized-iron nails.

Flashing : — Flash hips, ridges, and valley, with 9-oz. zinc.

Exterior Finish : — All the exterior finish is to be of clear, well-seasoned pine stock, ⅞″ thick.

Steps : — The treads of front steps to be of hard-pine. The floor of piazza formed with narrow boards, laid open.

Partitions : — Set the partitions generally with 2″ x 4″ spruce studs. Set 4 nailings to a lath, bridged with one row of plank pieces well fitted and nailed. Short partitions to be formed with 2″ x 3″. Partitions over voids to be strongly trussed or braced.

Plastering : — The walls of second story are to be furred, lathed, and back-plastered. The walls, ceilings, and partitions of the first and second stories, including closets, are to be lathed with good spruce laths, and to be plastered, two-coat work, ¾″ thick.

Kitchen Plastering : — There will be no lathing or plastering on the ceiling of kitchen, nor on the walls of same as high as dado capping. Oil-cloth, to be provided by the proprietor, will be nailed directly to studs. The joists and floor forming ceiling will show. To be tinted with lime-wash.

Under Floors : — The under floors of best quality hemlock.

Upper Floors :— The upper floor of kitchen, and closets off, to be of hard-pine. All other floors to be of the best clear spruce, planed, thoroughly seasoned, and kiln-dried in 5'' widths. The interior finish throughout to be of pine.

Stairs : — The stairs to basement to be formed with ⅞'' treads, planed and nailed on rough-cut plank carriages. The stairs from first to second floor to be in two flights, as shown, and of ⅞'' treads, and risers on plank carriages.

Newel Posts :— Three newel posts, out of 4'' x 4'', with turned ball terminals. The balusters ⅞'' x ⅞'' plain, square in section; all of clear pine.

Sashes : — The cellar windows to have 1½'' thick sashes, hung at top, and provided with hooks and staples to fasten when open. The sashes on first and second floors to be 1½'' thick, of pine, with hard-pine pulley-styles and beads. Sills of 2'' stock. The windows of kitchen, parlor, dining-room and porch, to be double-hung.

Casements : —The sashes generally on second floor to be casements hinged to open outwards, with link and hook fastening.

Doors: — All doors to be hung to rebated pine plank frames. The doors to be made with clear, kiln-dried pine stock. The front door and vestibule door to have locks, value, $2 each, knobs worth $2, and night-latches. Rear door to have good japanned bolts on the inside.

Locks and Fastenings: — All inner doors to have locks costing $6 per dozen, and knobs, value on the average, 37 cts. per pair. The doors generally to have plain japanned-iron loose-joint butt hinges.

Shelving: — Finish the closets generally as indicated on plans. Two tiers of shelving to those on ground floor, and linen closet on second floor. The remainder to have one tier each.

Hanging Strips: — All closets in bedrooms to have hanging strips and hooks.

Closet under Sink: —The sink in kitchen is to have closet beneath with cleated door.

Shelving in Kitchen: — The kitchen to have one tier of shelving at one end and part of side, supported on ⅝'' cut wood brackets.

Bath-room: — The bath-room to be left unfinished at present.

Bases: — Bases to principal rooms to be ⅞'' x 4''.

Chair-Rails: — The dining-room to have chair-rail, and kitchen to have rail to form cap to oil-cloth dado.

Ribs on Ceiling of Dining-room: — Light ribs are dotted on plan to be secured to ceiling of dining-room and parlor, to be hung with beaded frames, the spaces on each side of door being filled in with 1'' x 4'' frames to receive canvas on which the wall-paper will be hung.

Cornice in Parlor : — A small wood-moulding to form cornice in parlor only.

Glazing : — The windows generally will be glazed with second quality single-thick, cylinder glass.

Leaded Glass : — The upper portion of parlor window and also vestibule light will have light-tinted leaded glass.

PAINTING.

Exterior: — The outside wood-work and sashes to receive two coats of oil paint.

Shingles : — The shingles on second story to be stained before being laid.

Roof : — The roof shingles to be oiled.

Inside Wood-work : — The inside wood-work to be painted three coats.

PLUMBING.

Sink : — One enamelled iron sink in wash-closet off kitchen, and stop-cock, waste, etc.

Hopper Water-Closet : —One hopper water-closet in basement with lead pipe connecting with drain.

Estimate of Quantities and Prices ruling at Boston, Mass.

Mason-work, Messrs. Vinal & Dodge	$ 340.00
Carpenter-work, Messrs. Morton & Chesley	2,130.00
Heating-apparatus, Mr. Cyrus Carpenter	100.00
Plastering, Mr. Thos. Parker	142.50
Glazing, Messrs. Cook, Redding & Co.	24.13
Plumbing, Mr. Lunt	18.50
Painting, Mr. T. Burgess	100.00
Cement work, Mr. R. Jackson	50.00
Total	$2,905.13
Architect's fee	145.25
Total cost	$3,050.38

MASON-WORK.

107 cu. yds. of excavating	$ 37.45
25 ft. 6 in. glazed terra-cotta drain-pipes, @ 25 c.	6.25
912 cu. ft. of rubble walls, 1′ 6″ thick	148.00
250 cu. ft. of brickwork	115.00
5 thimbles and covers for stoves, @ 25 c	1.25
Setting one furnace in basement	10.00
27⅛ sq. yds. cement floor in basement	22.50
548 sq. yds. plastering, @ 26 c.	142.48

PAINTING.

97 sq. yds. shingles on outer walls stained yellow.
170 " shingles and roof oiled.
61 " plain two-coat work in oiled paint outside.
60 " painted moulded work, two coats outside.
50 " painting sashes and frames, outside doors and windows.
50 " " and varnishing do. inside.
166 " three-coat work inside house.
Total $100.00

PLUMBING.

1 hopper water-closet in basement	$ 8.00
Lead pipe to do.	3.00
Kitchen sink	7.50

CEMENT WORK ON WALLS.

91 sq. yds	$50.00

GLASS.

16 ft. super, plain tinted, leaded glass, @ 70 c.	$11.20
125 lights second-class, single-thick	12.93

HEATING.

1 portable furnace in basement, with register and tin piping, as indicated on drawings	$100.00

CARPENTER'S WORK.

124 lin. ft. sill for frame.
1353 sq. ft. frame up to second floor, set for cement-work.
1057 sq. ft. do., above second floor, covered with plain shingles.
104 " in two gables prepared for plastering.
100 " clapboarding on back of piazza or porch.
3 arches, 4″ thick.
4 posts (plain square), 5″ x 5″.
9 lin. ft. of plain square balustrade, of ⅞″ square bars.
50 sq. ft. open-laid floor, porch.
4 steps to porches.
10 sashes, double hung, 1½″ thick (average 15½ sq. ft.).
17 do. casements, do. (average, 13½ sq. ft.).
1 front door, 3′ x 7′ x 1¾″, six-panelled.
1 rear door, 3′ x 6′ 10″ x 1¾″, four-panelled.
1380 sq. ft. shingling on roofs.
1798 " framing in partitions, 2″ x 4″, 16″ centres; short lengths, 2″ x 3″.
70 " rough board partitions in cellar.
1 flight of stair steps to basement; no risers, ⅞″ treads, rough carriages.
844 sq. ft. joists on first floor, 2″ x 8″; two thicknesses.
857 " do. second floor.
Principal stairs in two flights, from first to second floor, nine treads, 7″ risers, all ⅞″.
10 doors on first floor, 2′ 10″ x 6′ 10″.
3 closet-doors, first floor, 2′ 8″ x 6′ 8″.
2 sash-lights, 18″ x 24″, 1½″ thick.
1 vestibule door and side-light; door three-panelled, 2′ 10″ x 6′ 10″.
76 sq. ft. shelving on first floor.
7 doors on second floor, 2′ 8″ x 6′ 8″.
3 doors to closets, 2′ 6″ x 6′ 6″.
50 sq. ft. shelving on second floor.
400 lin. ft. baseboard to rooms.
830 lin. ft. architrave.
52 lin. ft. light ribs and mouldings, ceiling of dining-room.
48 lin. ft. chair-rail, do.
48 lin. ft. base, do.
1 fireplace, as per detail drawing, No. 2 pine.
19 lin. ft. shelving, in kitchen.
4 brackets under do.
22 lin ft. wall-rail in kitchen, 1″ x 3″.
45 " moulding, forming cornice to parlor.
Total carpenter's work $2,128.00

CHESTERFIELD STEEPLE.

KING LEAR may have derived considerable satisfaction from his memorable exclamation, "Blow winds and crack your cheeks," but he would not have been so eager to encourage the hurricane had his home stood near some crumbling cathedral tower or rickety church steeple. The more timorous occupiers of the old-fashioned houses that cluster around the Chesterfield parish church have not felt thoroughly at ease during recent gales. They have retired to bed hesitatingly, not to slumber, but to toss sleeplessly on their pillows, rendered nervous by the thought that the crooked steeple, unable, perhaps, to withstand the tempestuous blasts, might come down suddenly and with even less warning than an avalanche gives. Luckily, these fears had far less foundation than the spire, and the famous steeple, the object of so much curiosity to all travellers on the Midland, has not been toppled over by the fierce gusts that have rioted in "the wrathful skies." Nevertheless, those who live within the shadow of the old and curiously shaped fabric that is always threatening to overbalance itself may be forgiven for feeling uncomfortable on stormy nights. Even as far back as 1817 the steeple was believed to be in a state of collapse. A daring expert, venturing as high as the crow-hole, was startled to find not only that the timbers comprising the framework of the spire were very much decayed, but that the steeple leaned very much toward the south, and was not less than six feet out of the perpendicular. Nay, the idea of the singular structure giving way filled him with such terror that he forgot his professional *sang froid*, and speedily descended from his lofty position a more cautious, if somewhat perturbed man. In 1818 a vestry meeting was actually held for the purpose of considering whether the steeple should be taken down. The inhabitants, however, were loth to demolish the architectural singularity which had been the town's pride for years; and when an independent surveyor reported that the carpenter's work at the base was so good that the steeple would probably last another century, they clutched at this opinion as readily as drowning men are said to catch at straws, and the twisted spire was left in peace.

It is doubtless the most extraordinary structure in the world, for "whichever way you turn your eye it always seems to be awry." No one can tell exactly when it was put up, but for at least five hundred years the grotesquely-shaped steeple, with its huge warped timbers and cloak of lead, has defied the tempest's howling and the lightning's incisive touch. Although assailed by many terrible storms the spire still rises crookedly, but firmly, two hundred and thirty feet above the church tower; and those who love old landmarks and relics of a bygone time trust that it may long remain on its dark stone pedestal, crowning the ancient church, which is not only rich in knightly monuments, but contains a rib of the marvellous dun cow killed by the Earl of Warwick!

The steeple has created more fun than any of Gilbert and Sullivan's operas. It has been likened to the uplifted tail of the Dragon of Wantley, to a corkscrew, to the leaning Tower of Pisa, and to a man perpetually tipsy; while one writer asserts that it sticks "with a mock-gravity air on the church tower, looking as comical as a jester on an Archbishop's back." There are many legends to account for its peculiar shape. One of these, taken from a very old book on "Church History," states that a Derbyshire magician engaged a village blacksmith to shoe Satan, but the work was done so carelessly that Lucifer's hoof was pricked, and the pain made him kick out so violently on passing Chesterfield Church that he twisted the spire. Another story charges the King of Darkness with being the cause of the steeple's deformity in an even more laughable way. It is to the effect that Satan, alighting one day to rest on the summit of the fabric, had his nose so tickled by the incense arising from the altar beneath "that he gave a terrible sneeze, and not merely shook

but actually twisted the steeple with this diabolical spasm." Yet a third tradition, says the writer of "Old and New Chesterfield," endeavors "to slander the fair sex of Chesterfield in its efforts to give a reason for the steeple's corkscrew-like form. It ungallantly asserts that pretty and virtuous women were scarce in the town; so scarce, indeed, that when a lovely and good woman approached the church one day to be married the steeple was astonished, and in astonishment bowed to the bride who possessed such rare qualities. Attempting to regain its original position, the steeple wrenched its back, and never recovered its upright attitude; nor is it likely to do so until another lovely and virtuous woman whispers her marriage vows in the church. But the legend, like the spire has been twisted. It really ought to say that so many lovely and virtuous women enter the old church that the steeple is perpetually bowing in recognition of their comeliness and purity."

These legends which are almost as familiar in the Midlands as the steeple itself, are not only entertaining but instructive, for they reveal wondrous power of imagination in a people, of whom it has been scathingly said:

> "Derbyshire born, and Derbyshire bred,
> Strong in the arm, but weak in the head."

Quite apart from the fables that have almost become a portion of its history, the steeple has more practical reason for its leanings than many politicians. It was straight when first erected. Neither demon's kick nor woman's frailty is responsible for its whimsical shape. The sun's heat and the wind's relentless force have shrunk its timbers and twisted its lead covering until the spire has become well-nigh as crooked as the "ways of the wicked."—*London News.*

NUTS AND WASHERS.

CHICAGO, ILL., September 7, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—In the issue of your paper for September 1, appeared an article by Professor Ricker, entitled "Dimensions of Rod-ends, Heads, Nuts and Washers," containing some ingenious formulæ for the determination of the proper size of washers bearing on wood. These formulæ, and especially the tables calculated in accordance with them, would be very useful if correct; but there is a serious error in the reasoning which complicates the results unnecessarily, and renders them quite misleading in some cases.

The object of the formulæ is to give the proper diameter of washer corresponding to any given size of rod. The crushing strain transmitted by the washer to the side of the timber is the same as the tension in the rod which pulls on the washer, and as the permissible tension varies directly as the sectional area of the rod, the bearing area of the washer will vary directly as the sectional area of the rod. It is also evident that the bearing surface of the washer will be to the sectional area of the rod in the same ratio that the safe tensile strength of the iron per square inch bears to the safe resistance to crushing per square inch of the wood. For example: if the rod will bear safely five tons per square inch, and the timber will resist one ton per square inch crushing strain, then the surface of the washer bearing against the wood must have an area five times that of the net cross-section of the rod.

Now, to quote from the article in question:—

"Let C' = ultimate resistance to crushing at right angles to the fibres of the wood, in net tons per square inch.

"Let k = the factor of safety for this crushing.

"Let $k = 1.25$ when the maximum safe tensile strain of the rod is very seldom exerted, as in the case of the rods of roof-trusses.

"Let $k = 2.5$ when this maximum safe strength is frequently or permanently exerted, as in the case of bridge-trusses."

So much is good; the writer of the article recognizes the difference between the strains on the rods of a roof-truss and those in a bridge, and provides against the more injurious character of the latter by reducing the unit strain for crushing of the wood, using double the factor of safety employed in the roof-truss; but, while thus caring for the safety of the timber, he neglects to make any such provision for the iron rods, and employs in all the formulæ the uniform tension of five tons per square inch. The result of this is that the washers on the rods of a bridge-truss are made *twice as large* as those on the *same rods* if put into a roof. For example, in the table for rods with enlarged ends, the washer for a one-inch rod to bear against pine has a diameter of 4.15 inches for temporary strains, and of 5.73 inches for permanent strains, the bearing area of the first being 12½ square inches, and of the second 25 square inches.

Now, if a given weight, as applied in a bridge, produces a greater or more injurious strain on the surface of the wood under a washer than the same weight in a roof-truss, it must also produce a greater strain on the nut, which ought, then, to be made twice as thick as that of the roof-bolt, and if the theory advanced in the article be correct, the table for the dimensions of nuts to resist "permanent" strains should be revised in this respect.

But this view of the case overlooks the fact that this increased strain must be transmitted by the rod, which also needs enlargement; in fact, the same reasons which lead to increasing the factor of safety for the pressure of the bridge washer point, with even greater clearness, to the necessity of increasing the factor of safety for the tension on the bridge-rod; for there is greater danger to the structure from the failure of a tension-rod, than from the crushing of the fibres under its washer. No engineer would think of designing a railroad-bridge and a roof truss with the same tensile unit strain for the iron rods. If five tons per square inch is safe for the former, seven or even seven and a half is equally safe for the latter, "when the maximum safe tensile strain is seldom exerted." There is no evidence to show that wood is injured by "permanent" strains more than iron, and many facts tend to prove the contrary. Iron is accused of crystallizing under repeated shocks, but no such charge is made against wood, which often bears strains very near its ultimate strength without apparent deterioration.

We shall be safe if we assume the same ratio between the factors of safety for permanent and temporary strains, for the crushing of the wood, and the tension of the rod. A similar thing is done by engineers in proportioning pins of eyebars to prevent crushing of the metal of the eye. This has been the subject of much experiment, and as the result, the bearing surface of the eye on the pin (when not modified by the bending of long pins) has a fixed ratio to the sectional area of the tension-bar. In structures where it is safe to permit a high tensile strain on the bar, the surface of the eye will, *for the same reasons*, bear the increased strain on it.

As with the eye and the nut, so with the washer, to bear against any given material; its surface should have a *fixed ratio* to the net sectional area for the rod; for whatever forces affect one affect the other in like manner. The washer which is suitable for a given rod in a roof-truss, will be equally safe for the same rod in a bridge, both to bear against the same material.

It now remains to determine the ratio of the crushing resistance of wood, to the tensile strength of wrought-iron.

Trautwine says that 1000 lbs. per square inch, indents well-seasoned white-pine $\frac{1}{20}$ of an inch; common yellow-pine about the thickness of writing paper, and ordinary black-oak, cherry or mahogany, not at all. The following tests of the resistance of various woods to indentation perpendicular to grain, made on the Government testing-machine, at the Watertown Arsenal in 1881, are useful for comparison with earlier experiments, and are probably as trustworthy as any tests made. The table is condensed from the report of the Chief of Ordnance, and gives the pressures which produced indentations of $\frac{1}{100}$ inches, and $\frac{1}{20}$ inches respectively. The first column gives the number of tests made, and the highest and lowest results of each series are recorded, as well as the average, to show the amount of variation in different samples. The blocks of wood tested were all clear and seasoned, and tested by pressing a cast-iron block of sixteen or nineteen square inches area against the wood. Most of the specimens were three to four inches thick. Thinner pieces gave slightly higher results. Knots increase the resistance to crushing.

INDENTATIONS PERPENDICULAR TO GRAIN.

Kind of Wood.	Number of Tests made.	Pressures producing indentations in lbs. per sq. in.					
		Indentation of $\frac{1}{100}$ in.			Indentation of $\frac{1}{20}$ in.		
		Minimum.	Maximum.	Average.	Minimum.	Maximum.	Average.
Spruce...............	4	400	600	450	875	1025	969
Whitewood..........	6	500	500	500	900	1150	966
White-pine..........	10	400	800	645	875	1160	1033
Oregon pine..........	1			700			1150
Yellow-birch.... ...	2	500	600	550	1650	2000	1825
Ash..................	2	1000	1000	1000	1800	1850	1825
Yellow-pine.........	2	1000	1000	1000	1900	1900	1900
White maple.........	2	700	1000	850	1900	2500	2200
Black-walnut.......	6	1000	2000	1660	2200	2600	2390
Black-walnut.......	6	1000	1600	1500	2360	2800	2500
White-oak...........	3	1000	1000	1000	2300	3550	2850

An indentation of $\frac{1}{20}$ of an inch may be taken as the limit of effective resistance of the wood, for beyond this point the fibres begin to shear, and the wood to crack. Inasmuch as with $\frac{1}{20}$ of an inch indentation the wood is practically uninjured, the strain producing this indentation corresponds to the limit of elasticity of wrought-iron in tension rather than to its ultimate strength, and if we use the same factor of safety that measures the ratio of the elastic limit to the working load of the iron rod in any given case, we shall have the same security in the wood against crushing that we have in the iron against tearing apart. The elastic limit in wrought-iron in tension may be assumed at about one-half its ultimate strength; and a factor of safety of five in reference to the ultimate strength is equivalent to a factor of 2½ on the elastic limit. This is the factor employed in the article referred to when the tensile strain in the rod is five tons per square inch.

The values of the constant C' which represent the resistance of the wood to crushing perpendicular to the grain, deduced by Professor Ricker, are .4 of a ton = 800 lbs. per square inch for white-pine, and 1.16 tons = 2320 lbs. per square inch for oak and other hard woods. On the basis of the Government tests given above, the constant for pine seems a trifle small compared with that assumed for oak, and 900 or 1000 lbs. could perhaps be used with safety; but for the present argument it is sufficient to accept 800 lbs., as the limit for white-pine.

Then in the case of a bridge, with a factor of safety of five, we will have a pressure on the wood of 800 ÷ 2.5 = 320 lbs. per square inch, and the bearing surface of the washer must be $\frac{10000}{320} = 31\frac{1}{4}$ times the sectional area of the rod when the ends are upset. The dimensions of the washers will be those given in Professor Ricker's table for permanent loads.

In the case of a roof, if our factor of safety for the rods is reduced from 5 to 3⅓, that for the crushing of the wood will be reduced in the same proportion from 2½ to 1⅔, and the pressure on the wood to correspond to 12,000 lbs. per square inch tension on the rod, will be 800 ÷ 1⅔ = 480 lbs. per square inch, and the bearing area of the washer will be $\frac{15000}{480} = 31\frac{1}{4}$ times the sectional area of the rod as in the former case. Therefore the same size of washer should be used in both cases.

If the half-size washer given in the table as suitable for temporary strains were used the pressure on the timber would be 482 × 2 = 960 lbs. per square inch, which is greater than the ultimate resistance we have assumed for it. This shows the necessity of using the same sized washers for temporary as for permanent strains, unless the unit strains in the roof are reduced to those employed in a railroad bridge; but an architect who should design a roof on that basis might wait in vain for a second client.

Very respectfully, Normand S. Patton.

LIGHTNING AND SOIL-PIPES.

Boston, September 26, 1883.

To the Editors of the American Architect: —

Dear Sirs, — I would like to enquire, through you, of Colonel Waring, Mr. Philbrick, or any of the conscientious engineers who counsel the carrying of soil-pipes through the roof, what precautions they take in the matter of protecting country buildings from lightning where there is no sewer or water service whose pipes offer good ground connections. That is, do they advise and enforce connecting the soil-pipe with the existing lightning-rods on the building, supposing there are any, or do they consider the soil-pipe in itself an efficient and sufficient conductor, supposing there are no conductors proper? What has called the matter afresh to my mind is that I have been lately called to examine and test a complicated system of plumbing in a large country house. A few years ago the system was re-arranged by an architect, and an endeavor was made to carry out the best views then in vogue, but when it came to carrying the soil-pipe through the roof it was found that it would come out so near a lightning-rod that the possible danger arising from such approximation occurred to both architect and plumber, and a halt was called while advice from a man who stands well in this community as a practical lightning-rod man was sought and obtained. His advice was such that the soil-pipe was turned into a spare ventilation flue below the roof, the lower end of which was sealed up.

I believe this was a mistake, and that, were it not that the deck-roof is tinned and the lightning-rods (copper ribbons) soldered to this tin roof, the arrangement would be more likely to cause an eruptive discharge between the rod and the soil-pipe, than if the soil-pipe had been carried through the roof. Perhaps, considering the protection offered by the tin roof, the present arrangement is well enough so far as lightning protection is concerned, though I disapprove of a main soil-pipe terminating in a brick flue of any sort. But I would like to hear from others an opinion as to whether my views or those of the lightning-rod man are sound. If my views are sound I would like to know if architects and engineers are as careful as they should be when running up soil-pipes to see that so important a conductor is properly connected with the system of lightning-rods which is already in place or is afterwards to be put up.

A peculiarity of the electrical protection of the house in question is, so far as I can determine, that although the conductors are copper and are properly connected with gutters and down-spouts, which are also of copper, yet the only earth-connection is in the rain-water cistern, an arrangement which I have supposed to be peculiarly adapted to produce explosions. Yet the house has stood for thirty years in a high exposed situation and has suffered no injury.

Very truly yours, W.

REFERRED TO OUR CONTRIBUTORS.

Boston, September 25, 1883.

To the Editors of the American Architect: —

Dear Sirs, — Will you please publish as soon as possible a plan of a house that will not cost more than one thousand dollars or less, that is a double house for two families, of about five rooms for each. You will publish them at once.

And oblige, J. T. B.

[If any architect can furnish the *rara avis* our rather peremptory correspondent desires we will consider the question of letting it try its wings in our pages. — Eds. American Architect.]

Buffalo, N. Y., September 12, 1883.

To the Editors of the American Architect: —

Sirs, — I think it would be a good policy and please a great many subscribers if you would publish a series of counters, and office-screens, finishes, etc. Please consider the matter and oblige,

Yours truly, C. W. Sumner.

ORIGIN OF THE STEPPED-GABLE.

Minneapolis, Minn.

To the Editors of the American Architect: —

Gentlemen, — Will you please inform me at what date and where the "stepped-gable," so common in German and Scotch houses, originated, and oblige, A Student.

[The "crow-stepped" or "corbie-stepped" gable was originally devised as a mode of fortifying the end of a roof of that shape, the steps forming a kind of parapet, which was sometimes pierced with loop-holes. In time of peace, the same form of gable afforded an opportunity for passing easily from one side to the other of a steep roof. The shape seems to have pleased the Scotch and Germans, who retained it, more or less modified, long after its original use was forgotten. — Eds. American Architect.]

NOTES AND CLIPPINGS.

El Paso del Norte, Mexico. — Paso del Norte is three hundred and sixty years old. It has one lonely street exactly seven miles long. Its principal point of interest is the Gaudaloupe Cathedral, which is over three hundred years old, and has had no repairs for at least two hundred years. It has no pews. There is only a piece of carpet spread in front of the altar, and on this the worshippers kneel one at a time. Generations have come and gone, and nothing has been done to improve this ancient town until now, when they have begun the restoration of the Grand Plaza. The Mexican Central Railroad Depot is the only modern edifice in the place. —*Philadelphia Press.*

Comparative Strength of Minnesota and New England Granites. — Mr. N. H. Winchell, of Minneapolis, Minn., recently had occasion to test the qualities of the building stones of Minnesota, and the results obtained are interesting in many respects. Mr. Winchell subjected the stones to the usual tests of crushing, and used for this purpose specimens consisting of two-inch cubes. These specimens included sandstones, limestones, granites and trap rocks to the number of about one hundred. Great care was taken in preparing them, and they were sent to General Gillmore at Staten Island, and there subjected to the tests, which were applied by crushing the samples, one in the direction of the schistose structure and one across it. Taking the average of the results of twenty samples of Minnesota granites, it appears that the strength of a cubic inch was equal to 26,675 pounds. Allowing eleven per cent difference between the process of crushing between steel plates and wooden cushions, this gives an average for Minnesota granites of 23,318 pounds. Testing New England granites gave for the average of twenty specimens a strength per cubic inch of 14,946 pounds. After discussing several probable sources of error, Mr. Winchell suggested causes why the Minnesota granites may be stronger than those of New England, and among other things stated that those of the Western regions may have been less changed by decay. The lateness of the glaciation to which they were exposed may have left them comparatively fresh through the recent removal of a considerable thickness. — *Iron Age.*

Expected Discoveries at Rome. — Students of Roman art and archæology must prepare themselves for a campaign of unprecedented activity and importance. I do not think I exaggerate in declaring that at the present moment no other capital in Europe can be compared to Rome as regards the extent and the importance of public works closely followed by private enterprise. The embankment of the Tiber, the new railway station in the Trastevere, the military and city hospitals, the barracks for three regiments, the military school, the palace of the national bank, the law courts, the Ministry of War, the monument to Victor Emmanuel, the Via Nazionale from Piazza di Venezia to Ponte S. Angelo, the Via del Tritone carried as far as the Piazza Colonna, the widening of the Corso, the new bridges on the Tiber, the twenty-one large fortresses, the new ramparts, or inner circle of defence, twenty-two miles long, the new drilling and parade grounds between the Tiber and the Via Angelica, the new system of drainage — all these works in course of execution require the excavation of many millions of cubic metres of ground, every one of which may provide a surprise to the archæologist. Private houses are built or rebuilt at the rate of three hundred per annum. The Government and the Municipality keep the strictest watch over this formidable amount of work and excavation with a fair success, considering that every guard has to keep an eye over one thousand or more workmen. Those who are always ready to criticise what their neighbor does, those who denounce to the world from time to time the disappearance, the demolition of some bits of Roman ruins, ought to remember that this immense amount of work, necessary for the transformation of Rome into a clean, healthy, comfortable town, requires some sacrifice. Up to the present time many have been pleased to consider the population of Rome as a kind of *main-morte* of the scientific world, whose mission is simply to sit as a model for artists — to whom must be applied what the Gospel says of the maniac from Gerasa: "*Vestimento non induebatur; neque in domo manebat, sed in monumentis.*" At any rate, the experience of these last twelve years has shown that the interests of art and archæology are not injured or compromised by the material improvement of the town; that our antique, mediæval, and Renaissance monuments do not lose a particle of their interest if they are delivered from their shameful and dirty surroundings. The building of the new quarters and the improvement of the old ones are an astonishing source of daily discoveries. The stock of the old Capitoline Museum has been more than doubled in less than ten years; the map of the ancient town has been traced and surveyed in regions which were marked by a blank space in Canina's plan. When the *piano regolatore* of the town was submitted for examination to a committee of archæologists, they had only one point to criticise — the demolition of the bell-tower of S. Benedetto in Piscinula! — and I dare say the *piano regolatore* involves a series of works to the amount of three hundred million lire. This detail shows how careful we are in planning and in carrying on the improvements of our city, and how little we need to be taught by hysterical women how to take care of our monumental treasures. — *Correspondence London Athenæum.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

285,371. EAVES-TROUGH HANGER. — Jonathan P. Abbott, Cleveland, O.

285,378. BATH-TUB ATTACHMENT. — Geo. P. Bassett, Cincinnati, O.

285,382. LOCK. — Joseph Breyer, Cincinnati, O.

285,397. SMOKE-CONSUMING STOVE. — Edwin L. Dodge, Somerville, Mass.

285,404. T-SQUARE. — Joseph Gardam, Brooklyn, N. Y.

285,405. FOLDING-SQUARE AND SCALE-HOLDER. — William H. Goldsberry, Cedar Rapids, Iowa.

285,415. WRENCH. — William E. Lawrence, New York, N. Y.

285,437. ELEVATOR-ATTACHMENT. — Jas. D. Sinclair, Brooklyn, N. Y.

285,440. AUGER. — Jas. Swan, Seymour, Conn.

285,446. CUTTING-NIPPERS.—Henry B. Todd, Meriden, Conn.

285,449. WRENCH. — Charles D. Wells and Charles A. Newlin, Millville, N. J.

285,452. HOLLOW-TILE ARCH FOR CEILINGS. — Peter B. Wight, Chicago, Ill.

285,459. FIRE-EXTINGUISHING SYSTEM. — Charles E. Buell, New Haven, Conn.

285,471. FIRE-ESCAPE. — William Henry Harrison Doane, Morganville, Kans.

285,484. SCREW-DRIVER. — Micajah C. Henley, Richmond, Ind.

285,485. HEATING-APPARATUS. — Hezekiah Howe, Wellsville, N. Y.

285,505. SASH-BALANCE. — William Ormsby, Boston, Mass.

285,533. COMBINED VENTILATING AND HEATING APPARATUS. — Corydon Wheat, Geneva, N. Y.

285,539. SYSTEM OF HEATING AND VENTILATING BUILDINGS. — Nathaniel Wheeler, Bridgeport, Conn.

285,542. FIRE-ESCAPE.—Richard E. Andrew, Shepherdstown, W. Va.

285,546. BENCH-PLANE. — Leonard Bailey, Hartford, Conn.

285,564. FIRE-ESCAPE. — Oliver N. Brooks, Guilford, Conn.

285,574. PLUMBER'S TRAP.—Robert Clarke, Brooklyn, N. Y.

285,575. DOOR-HANGER. — Benjamin J. Cloes, Lake Bluff, Ill.

285,583. MITRE-BOX AND JACK-BOARD. — Henry W. De Courtenay, Boston, Mass.

285,601. BEVEL-SQUARE. — Michael Farley, Portland, Oreg.

285,603. FIRE-ESCAPE. — John R. Fell, Philadelphia, Pa.

285,605. LADDER. — Orlando V. Flora, Madison, Ind.

285,606. FIRE-ESCAPE. — Paul Thomas Forsyth, Memphis, Tenn.

285,625. COMBINATION DAYLIGHT-REFLECTOR. — Thaddeus Hyatt, New York, N. Y.

285,636. METALLIC TILE FOR FLOORS, ETC. — Andrew H. Lord, Chicago, Ill.

285,058. SASH-LOCK. — Frederick Osterhage, Vincennes, Ind.

285,663. PACKAGE-ELEVATOR. — Frank I. Pearce, Chicago, Ill.

285,669. RATCHET-WRENCH. — Albert E. Petticrew, Springfield, O.

285,681. SAFETY-GUARD FOR ELEVATOR-HATCHWAYS. — John P. Richardson, Cambridge, Mass.

285,690. FIRE-ESCAPE LADDER.—Stephen D. Shattuck, Cohocton, N. Y.

285,740. FIRE-ESCAPE. — Emil C. Eyl, Jefferson City, Mont.

285,744. FIRE-ESCAPE. — James H. Frazee and George M. Culver, Rushville, Ind.

285,756. FIRE-ESCAPE. — William A. King, Cleveland, O.

285,759. STABLE. — George A. Knight, Lamartine, Pa.

285,762. SAFETY-ATTACHMENT FOR ELEVATORS. — Oliver S. Nowell, Boston, Mass.

285,770. GREASE-TRAP FOR SINKS. — John Tucker, New York, N. Y.

285,774. APPARATUS FOR RAISING WATER FROM WELLS HAVING WATER-BEARING STRATA OF DIFFERENT HYDROSTATIC LEVELS. — John B. Yeagley, Indianapolis, Ind.

285,775. SPIRIT-LEVEL. — Geo. B. Youngs, Rochester, N. Y.

285,776. KILN FOR BURNING TILES, EARTHENWARE, ETC. — David Laemmle, Fort Wayne, Ind.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report thirty-one permits have been granted, the more important of which are the following: —

J. Schneider, 2 three-st'y brick buildings, s w cor. Fairmount and Collington Aves.

F. D. Sauerwein, 10 two-st'y brick buildings, e s Fulton Ave., n of Lorman St.

J. A. Swingley, 2 three-st'y brick buildings, w s Arlington Ave., between Edmondson Ave. and Franklin St.

Winchester Mason, 10 two-st'y brick buildings, s s Randall St., between Light St. and Riverside Park.

J. M. Honewell, 8 two-st'y brick buildings, w s Vincent Alley, s of Edmondson Ave.

M. C. Irvin, 2 two-st'y brick buildings on n s, and 2 two-st'y brick buildings on s s of alley in rear of Mount St., between Fayette and Lexington Sts.

M. Campbell, 2 three-st'y brick buildings, n s Bank St., w of Central Ave.

Enoch Pratt Library, one-st'y brick building, s w cor. Hollins and Calhoun Sts., and one-st'y brick building, n e cor. Fremont and Pitcher Sts.

Richard Russell, two-st'y brick stable in rear s e cor. Mount and Tennant Sts.

A. Gregg & Co., four-st'y brick buildings, s w cor. Charles and Barnet Sts.

Jesse B. Irvine, 18 three-st'y brick buildings, e s North St., between Lanvale and Townsend Sts.; 4 three-st'y brick buildings, s s Townsend St., e of North St.; 4 three-st'y brick buildings, n s Lanvale St.

L. Turnbull, 14 three-st'y brick buildings, s s Lanvale St., between Carter St. and Greenmount Ave.

W. T. Phillips, 5 three-st'y brick buildings, s s Mulberry St., w of Gilmor St.

Allen D. Spencer & Co., 2 three-st'y brick buildings, w s Battery Ave., between Clement and West Sts.

Chas. Wheeler & Co., 3 two-st'y brick buildings, w s Battery Ave., between Clement and West Sts.

John W. Locke, two-st'y brick building, s s Orleans St., between Broadway and Ann St.

Geo. Sanders, three-st'y brick building, e s Gilmor St., between Montrose and Fayette Sts.

Lineweaver & Co., four-st'y brick building, s w cor. Grantby St. and Slemmer's Alley.

Dr. John I. King, 2 three-st'y brick buildings, e s Carey St., between Harlem and Edmondson Aves.

The labor market quotations remain unchanged.

Boston.

BUILDING PERMITS. — *Brick.* — *Unnamed Pl.*, rear Forty-seventh St., Ward 14, for Henry Souther, stable, 24′ x 44′, one-st'y mansard; Wm. T. Eaton, builder.

Dorchester Ave., cor. Preble St., Ward 15, for David H. Gear, dwell. and store, 26′ x 53′, four-st'y flat; J. F. Smith, builder.

Beacon St., Nos. 382 *and* 384, Ward 11, for Samuel T. Ames, 2 dwells., brick and stone, 24′ x 66′, three-st'y mansard; S. T. Ames, builder.

South St., cor. Beach St., Ward 12, for Wm. P. Blake and John B. Osborne, mercantile, 27′ 6″ x 110′ 6″, five-st'y flat; James H. Kelly, builder.

Commonwealth Ave., No. 266, Ward 11, for John W. Shapleigh, dwell., 25′ x 60′, three-st'y mansard; Antoine Xavier, builder.

Vale St., Nos. 43 *and* 45, rear, Ward 21, for Dennison Manufacturing Co., manufactory, 42′ x 80′, three-st'y flat; D. H. Jacobs & Son, builders.

Wood. — *Cambridge St.*, rear, near Howard St., Ward 25, for N. & G. D. Chamberlain, 2 dwells., 15′ x 20′, two-st'y flat; Otis Wheeler, builder.

Crosby St., near Washington St., Ward 20, for Patrick Crosby, dwell., 21′ x 31′, two-st'y pitch; John Gately, builder.

Polk St., Ward 3, for A. O. Smith, et als., storage, 31′ x 31′, one-st'y pitch.

Crawford St., near Elm Hill Ave., Ward 21, for Mrs. E. D. Mallory, dwell., 36′ 6″ x 47′, two-st'y pitch; Spinney & Haddock, builders.

Waumbeck St., near Warren St., Ward 21, for Neil McNeil, dwell., 26′ x 41′, two-st'y pitch; NcNeil Bros.

Hemlock St., near Washington St., Ward 23, Elizabeth Patterson, stable, 14′ x 18′, one-st'y pitch; Peter Heany, builder.

Cottage St., rear, near Dudley St., Ward 20, Louis S. Adams & Co., storage coal, 30′ x 125, one-st'y pitch; John Horsford, Builder.

Harvest St., near Boston St., Ward 15, for L. E. H. Jones, stable, 22′ x 26′, one-st'y pitch; C. E. Ricker, builder.

Florence St., Ward 23, for S. W. Cunningham, dwell., 22′ 5″ x 28′, two-st'y pitch; E. F. Moulton & Co., builders.

Sparhawk St., near Cambridge St., Ward 25, for Frank G. Newhall, 2 dwells., brick and frame, 24′ x 68′, two-st'y pitch; Henry M. Perry, builder.

Charles St., near Dorchester Ave., for Benj. D. MacDonald, dwell., 22′ x 30′, two-st'y pitch; Isaac Atwood, builder.

Evans St., rear, near Thetford St., Ward 24, for Samuel T. Long, stable, 20′ x 24′, one-st'y pitch; S. T. Long, builder.

Wakulla St., near Dale St., Ward 21, for John O. N. Stultz, 3 dwells., 21′ x 31′, two-st'y pitch; John Polton, builder.

K St., No. 113, Ward 14, for J. Frank Foster, dwell., 24′ 6″ x 35′, two-st'y mansard; L. D. Robinson, builder.

Chicago.

FLATS. — Jno. Addison is architect for three-st'y flats on Rush St., for S. P. Hanson; cost, $26,000.

E. Baumann, architect, has made the plans for three-st'y flats on Lincoln Ave., for John Woltz; cost, $8,000.

HOUSES. — Wheelock & Clay are architects for 5 two-st'y dwells. on Groveland Park Ave., for U. P. Smith; cost, $25,000.

P. C. Hanford will build a two-st'y dwell. on Calumet Ave.; cost, $15,000.

Mrs. E. G. Russell will erect a two-st'y dwell. at 525 West Monroe St.; cost, $10,000; R. G. Stiles, architect; Snow & Alsop, builders.

Bauer & Hill have completed plans for a three-st'y dwell. to be erected on Lasalle Ave., for Chas. Halla: cost, $10,000.

B. W. S. Olark, architect, has plans completed for two-st'y dwell., stone front, terra-cotta trimmings, to be built for Mr. Long, at cor. Forty-third St. and Wolcott Ave.; cost, $10,000.

STORE. — Charles A. Dupee will erect a four-st'y store on Lake St.; cost, $10,000; Dixon & Townsend are the architects.

STORE AND FLATS. — P. W. Ruehl, architect, has made plans for three-st'y store and flats on West Twelfth St.; cost, $10,000; M. Schmitt, owner.

H. Daniels will build 2 three-st'y stores and flats on Cottage Grove Ave.; cost, $13,000; architect, L. Klinkerfues.

BUILDING PERMITS. — Charles Heinbach, two-st'y dwell., 111 West Eighteenth St.; cost, $3,600.

S. P. Hanson, three-st'y flats, 49 and 51 Rush St.; cost, $26,000; architect, Jno. Addison; builders, Barney & Rodtz.

Frank Hawat, two-st'y dwell., 735 Loomis St.; cost, $3,200.

E. Schrieder, two-st'y store and dwell., 627 Blue Island Ave.; cost, $4,400.

M. Schmitt, three-st'y store and flats, 320 West Twelfth St.; cost, $10,000; architect, P. W. Ruehl; builders, Swartz & Keys.

H. Daniels, 2 three-st'y stores and flats, 3842 and 3844 Cottage Grove Ave.; cost, $13,000; architect, L. Klinkerfues; builder, H. Appel.

N. Barnes, two-st'y flats, 328 Webster Ave.; cost, $5,000; architects and builders, Scott & Gage.

M. Suntanka, two-st'y store and dwell., 614 West Seventeenth St.; cost, $4,500.

Mrs. E. G. Russell, two-st'y dwell., 525 West Monroe St.: cost, $10,000; architect, R. G. Stiles; builders, Snow & Alsop.

Chas. A. Dupee, four-st'y store, 240 Lake St.; cost, $10,000; architects, Dixon & Townsend; builder, R. E. McKay.

Turner & Bond, 20 cottages, Hanover St., near Thirty-first St.; cost, $25,000.

A. Erickson, three-st'y flats, 166 Townsend St.; cost, $4,000.

P. Smith, two-st'y dwell., 351 South May St.; cost, $2,800.

C. Champion, 3 two-st'y dwells., 31 to 35 Hoyne Ave.; cost, $6,000.

John Woltz, three-st'y flats, 143 Lincoln Ave.; cost, $8,000; architect, E. Baumann; builder, G. Eberlen.

S. Nelson, two-st'y dwell., 458 Belden Ave.; cost, $5,000; architect, L. G. Hallberg; builder, J. Downey.

Jacob Hepp, warehouse, 75 to 81 West Chicago Ave.; cost, $3,000.

C. E. Peterson, three-st'y store and flats, 3226 State St.; cost, $5,500.

W. L. B. Jenney, three-st'y dwell., 116 Third Ave.; cost, $4,000.

D. Fitzpatrick, three-st'y dwell., 451 Taylor St.; cost, $5,000; architect, A. J. York; builder, F. Fenner.

V. Sevora, two-st'y dwell., 693 West Eighteenth St.; cost, $3,000.

James Scheahan, two-st'y dwell., 2357 Prairie Ave.; cost, $5,000; architect, Cass Chapman; builder, J. O'Shay.

U. P. Smith, 5 two-st'y dwells., 3224 to 3239 Groveland Park Ave.; cost, $25,000; architects, Wheelock & Clay; builder, W. E. Wheeler.

H. Copeland, two-st'y dwell., 703 Congress St.; cost, $3,500.

J. H. Swan, barn, 2623 Michigan Ave.: cost, $4,000; architects, Treat & Foltz; builder, A. Bickmolt.

F. Tumler, two-st'y store and dwell., 738 Milwaukee Ave.; cost, $6,000; architect, H. Kley; builder, E. Menshing.

Thos. Lorenz, two-st'y dwell., 103 Mather St.; cost, $3,800.

Chas. Halla, three-st'y dwell., 592 Lasalle Ave.; cost, $10,000; architects, Bauer & Hill.

W. R. Clark, two-st'y dwell., 512 West Sixteenth St.; cost, $4,000.

Schumacher & Sons, three cottages, 12 and 13 Marvin St.; cost, $2,000.

P. C. Hanford, two-st'y dwell., 2008 Calumet Ave.; cost, $15,000.

J. Fuss, two-st'y dwell., 274 West North Ave.; cost, $3,500.

J. Jensen, 6 cottages, 121 to 131 Coblentz St.; cost, $5,000.

Wm. Cuthbert, two-st'y dwell., 3636 Prairie Ave.; cost, $8,000; builder, B. N. Branch.

J. Huber, two-st'y livery-stable and dwell., 285 North State St.; cost, $4,800; architect, Otto Matz; builder, Geo. Fries.

E. Heno, three-st'y store and flats, 479 Sedgwick St.; cost, $6,800; architect, J. Schweitzer; builder, Geo. Fries.

Dr. J. R. Bucan, two-st'y flats, 694 Chicago Ave.; cost, $4,500; architect, D. Wilson; builders, Wilkin & Holman.

Milwaukee, Wis.

HOUSES. — Ground has been broken for a dwell., to cost $11,000, for Dr. Danforth, on the n w cor. of Division and Van Buren Sts.

William Pilger, residence on Astor St., First Ward; cost, $5,000.

Mrs. Terry is to have a house, to cost about $10,000, built on the East Side.

Plans for the new Colby Block, on the n w cor. of Milwaukee and Mason Sts., are about completed.

BUILDING PERMITS. — J. B. Wright, frame dwell. for Hugh Reynolds, on Harmon St., Fifth Ward; cost, $4,000.

Joseph Boehm, frame house for Mrs. Phelan, on Virginia St., Fifth Ward, to cost $2,700.

George Gruendler, brick dwell. on Oneida St., Seventh Ward; cost, $4,000.

William Pilger, brick dwell. on Astor St., First Ward, to cost $5,000.

Gilhaas & Co., brick veneered dwell. for L. C. Kommonda, on Fourth St., Second Ward; cost, $3,000.

O. Knie, brick dwell. for Dr. Danforth, on Division St., First Ward; cost, $11,000.

J. Pauler, frame store for J. Pauler, on Ninth Ave., Eighth Ward; cost, $3,000.

New York.

APARTMENT-HOUSES. — On Sixty-ninth St., between Second and Third Aves., 12 five-st'y brownstone apartment-houses, 25′ x 80′ each, are to be built at a cost of about $200,000: four by Mr. Andrew Kelly, and eight by Mr. C. A. Buddensieck.

Four five-st'y brick and stone flats, three 25' x 80', and the other 17' x 80', are to be built at a cost of about $72,000, on the s s of One Hundred and Eighteenth St., between Third and Lexington Aves., for Mr. John Walker, from designs of Mr. J. H. Valentine.

Factory. — A three-st'y brick factory, 24' x 80', is to be built for Mr. Robert Steinhardt, on the n e cor. of Eleventh Ave. and Thirty-seventh St., to cost $10,000, from designs of Mr. Geo. B. Pelham.

Houses. — Nine first-class brick and Belleville stone residences, four stories and basement, 16' 8'' x 65', with extension, are to be built on the south side of Fifty-fifth St., w of Sixth Ave., for Mr. C. T. Barney, at a cost of $180,000, from designs of Mr. Jas. Brown Lord.

Building Permits. — *East Seventy-ninth St., No.* 239, five-st'y brick and brownstone front tenement, tin roof; cost, $17,000; owners, Timothy McAuliffe, 916 Lexington Ave., and Henry G. Gabay, 245 East Fifty-third St.; architect, A. B. Ogden; builders, Cook & Higgins.

One Hundred and Thirty-third St., s s, 75' w Madison Ave., six-st'y brick brewery, tin roof; cost, $125,000; owner and builder, James Everard, 671-675 Washington St.; architect, Otto C. Wolf.

One Hundred and Forty-fifth St., n s, 400' e Willis Ave., three-st'y frame dwell., tin roof; cost, $4,000; owner, John Murphy, St. Ann's Ave., cor. One Hundred and Forty-ninth St.; architect, Arthur Arctander.

One Hundred and Fifty-second St., n s, 135' w Third Ave., 2 three-st'y frame dwells., tin roofs; cost, each, $2,500; owner, Geo. Weis, Bergen Ave., cor. One Hundred and Forty-eighth St.; architect, Arthur Arctander.

Christopher St., s e cor. Bedford St., five-st'y brick tenement and store, tin roof; cost, $25,000; owner, John Totten, 240 West Forty-ninth St.; architect, C. F. Ridder, Jr.

Bedford St., e s, 28' s Christopher St., five-st'y brick tenement and store, tin roof; cost, $15,000; owner and architect, same as last.

One Hundred and Fourteenth St., n s, 80' e First Ave., three-st'y brick dwell., tin roof; cost, $4,500; owner, Mrs. Catherine Kehoe, n e cor. First Ave. and One Hundred and Fourteenth St.; architect, John McIntyre.

One Hundred and Eighteenth St., s s, 225' w Third Ave., five-st'y brick tenement, tin roof; cost, $15,000; owner, John Walker, 233 East One Hundred and Thirteenth St.; architect, J. H. Valentine; builders, Walker & Gelston.

One Hundred and Eighteenth St., s s, 242' 2'' w Third Ave., 3 five-st'y brick tenements, tin roofs; cost, each, $18,000; owner, architect and builders, same as last.

Broadway, n e cor. Fifty-fifth St., nine-st'y brick and stone flat, brick and cement roof; cost, $420,000; owner, Herman Hoefer, 241 West Forty-third St.; architects, Thom & Wilson.

Eleventh Ave., No. 477, two-st'y brick tenement, gravel roof; cost, $3,000; owner, P. Thorp, 601 West Thirty-eighth St.

Second Ave., n w cor. One Hundred and Twenty-fourth St., five-st'y brownstone front tenement and store, tin roof; cost, $20,000; owner and builder, Michael Fay, 416 East One Hundred and Twentieth St.; architect, J. H. Valentine.

Second Ave., w s, 19' 11'' n One Hundred and Twenty-fourth St., 3 five-st'y brownstone front tenements and stores, tin roofs; cost, $18,000; owner, architect and builder, same as last.

Vesey St., Nos. 63 *and* 65, five-st'y brick tenement and store, tin roof; cost, $15,000; owner, Ed. M. Cary, East Milton, Mass.; lessee, James P. Bennett, s e cor. Vesey and Jeremiah Sts.; architect, Hugo Kafka.

West Twenty-sixth St., Nos. 455 *and* 457, five-st'y brick factory, gravel roof; cost, $20,000; owner, The John Tragreser Copper Works, 447 West Twenty-sixth St.; architect, M. C. Merritt.

Eighty-second St., n s, 115' w Fourth Ave., 5 four-st'y brownstone front dwells., tin roofs; cost, each, $17,500; owner, Silas M. Styles, 143 West One Hundred and Thirtieth St.

Anderson Ave., w s, 100' s Highbridge St., 2 two-st'y frame dwells., tin roofs; cost, $2,000; owners, Matthew and Cath. Ziegler, Highbridge St., cor. Claremont Ave.; architect, A. Spence.

Grand St., Nos. 383 *and* 383½, four-st'y brick tenement and store, tin roof; cost, $14,000; owner, Antonio Minaldi, 361 Grand St.; architect, B. Walther.

Greenwich St., No. 428, three-st'y brick boiler-house and dwell., tin roof; cost, $7,000; owner, Jas. Pye, 215 West Forty-fifth St.; architect, Thos. R. Jackson.

Seventy-third St., s s, 300' w Ninth Ave., 3 four-st'y brownstone front dwells., tin roofs; cost, total, $54,000; owner, Anna McDonald, 271 East Seventy-Eighth St.; architect, Jas. E. Ware; builder, Chas. McDonald.

Third Ave., e s, 145' n One Hundred and Fiftieth St., three-st'y brick dwell., tin roof; cost, $4,000; owner, Peter Kirchhof, cor. Third Ave. and One Hundred and Fiftieth St.; architect and carpenter, Henry Piering; mason, Chas. Huffen.

East Fortieth St., No. 312, two-st'y brick stable and dwell., tin roof; cost, $10,000; owner, Ann Killaan, on premises; architect, Albert Wagner; builder, Gordon Bros.

Twenty-eighth St., foot of E St. (Bellevue Hospital), five-st'y brick dwell., iron and slate roof; cost, $15,000; owner, Dept. of Public Charities and Correction, City of New York, 66 Third Ave.; architect, Jos. M. Dunn; builders, Moran & Armstrong.

Alterations. — *West Seventy-fifth St., No.* 318, raise one st'y, change stairs and elevator, take out east wall, and put in girders and posts; cost, $16,000; owner, Maria Moss, 421 West Twenty-second St.; architect, G. H. Budlong.

Philadelphia.

Building Permits. — *Sixteenth St.*, e s, n of Dickinson St., 12 three-st'y dwells., 16' x 50'; W. R. Matchett, owner.

Dickinson St., n s, w of Fifteenth St., 22 three-st'y dwells., 16' x 50'; W. R. Matchett, owner.

Sixteenth St., w s, s of Dickinson St., 6 three-st'y dwells., 16' x 50'; W. R. Matchett, owner.

Mole St., e and w s, between Reed and Dickinson Sts., 31 two-st'y dwells., 14' x 38'; W. R. Matchett, owner.

Beach St., e s, s of Otis St., two-st'y stable, 37' x 94'; Cook & Furman, contractors.

Madison Ave., s s, between Emerald and Jasper Sts., 8 two-st'y dwells., 15' x 44'; D. Trainor, contractor.

Collins St., cor. Huntingdon St., stable, 30' x 40'; Chas. Yeltman, owner.

Adam St., s s, w of Emerald St., three-st'y dye-house, 44' x 153'; Firth & Foster Bros., owners.

Almond St., n of Lehigh Ave., two-st'y stable, 20' x 34'; Frank Conroy, contractor.

Tasker St., n s, e of Second St., two-st'y store and dwell., 20' x 26'; Jno. Haglet, owner.

Lawrence St., cor. Orkney St., between Huntingdon and Cumberland Sts., 18 two-st'y dwells., 13' x 26' and 16' x 40'; F. Lambrecht.

Carlisle St., n of Susquehanna Ave., two-st'y stable, 30' x 34'; H. Waters, contractor.

Cedar St., e s, n of Somerset St., two-st'y dye-house, 45' x 110'; Edward Dingler, contractor.

Thirteenth St., cor. Snyder Ave., one-st'y car-house, 84' x 200'; Wm. McPherson, contractor.

North Second St., No. 1910, three-st'y store and dwell., 16' x 50'; Ed. J. Devlin, owner.

Walnut Lane, near Township Line, two-st'y dwell., 18' x 34'; Jno. Breidlin, contractor.

Haines St., e of Limekiln Pike, 4 two-st'y dwells., 15' x 30'; E. McDermond.

Neff St., s s, e of Melvale St., two-st'y store and dwell., 16' x 20'; Thos. Cassady, contractor.

Mill St., n s, e of Cumberland St., engine-house and picker-room, 40' x 77'; A. Jenkins, contractor.

Fifteenth St., n of Columbia Ave., 2 three-st'y dwells., 18' x 70'; J. S. Albright, owner.

Twenty-second St., cor. Walnut St., two-st'y addition to Sunday-school building, 22' x 73'; J. A. Decker, contractor.

York St., above Green Lane, addition to dwell., 32' x 46'; W. W. Grubb & Bro., contractors.

North Front St., No. 2420, three-st'y dwell., 18' x 40'; Thos. Crampton, owner.

Tacony St., w s, n of Margaretta St., two-st'y store and dwell., 14' x 34'; Chas. Strickler, contractor.

Armat St., e of Main St., 5 three-st'y dwells., 22' x 28'; A. Reiver, owner.

North Eighth St., No. 149, three-st'y dwell. and store, 16' x 45'; F. Thurwanger.

James St., s w s, between Thompson and Edgemont Sts., 8 two-st'y dwells., 15' x 28'; Chas. Judge.

Pearl St., w of Thirty-third St., two-st'y stable, 27' x 34'; Geo. D. Miller, owner.

Reed St., w of Twelfth St., 2 three-st'y dwells., 18 x 60'; D. A. Hall.

Wood St., No. 2227, second-st'y addition to machine-shop, 30' x 100' ; Walker Bros. & Co.

Carpenter St., No. 916, two-st'y brick building, 17' x 60'; Thos. Bradley, contractor.

Lehigh Ave., e of Bevan St., two-st'y dwell., 18' x 44'. Thos. L. Kelly, contractor.

Nicholas St., s s, w of Twenty-fifth St., 12 two-st'y dwells.; 14' x 28', J. S. Carre, owner.

Hope St., cor. Berks St., three-st'y addition to factory, 21' x 160'; Montague & White, owners.

Franklin St., cor. Eighth St., above Cumberland St., 4 two st'y dwells., 15' x 42' and 15' x 48'; C. H. Wisler, owner.

Lieper St., above Unity St., two-st'y dwell., 16' x 46'; B. H. Foulkrod, contractor.

Township Line, cor. Manheim St., two-st'y dwell., 50' x 50'; Jas. H. Errickson, contractor.

Cadwalder St., e s, n of Thompson St., three-st'y dwell., 17' x 50'; Jas. McCartney, contractor.

Bacon Lane, between Fisher's Lane and Wistar St., two-st'y stable, 32' x 62'; Samuel West, owner.

Allegheny Ave., cor. Frankford Road, one-st'y Baptist chapel, 34' x 57'; S. R. Stewart, contractor.

South Second St., Nos. 1413 *and* 1415, 2 two-st'y stores and dwells., 16' x 51'; E. Cubberly, contractor.

Nevada St., Nos. 1017 *and* 1019, 2 two-st'y dwells., 16' x 45' and 16' x 50'; W. C. Merritt, contractor.

School Lane, cor. Township Line, four-st'y dwell., 42' x 85'; C. C. Henchman, Superintendent.

St. Louis.

Building Permits. — Thirty-nine brick dwells., thirty frame dwells.

August Meyer, two-st'y brick dwell.; cost, $3,200; R. Richard, builder.

John Long, two-st'y brick dwell.; cost, $3,200; J. J. Wharton, builder.

E. W. Harris, two-st'y brick dwell.; cost, $2,800; J. B. Legg, architect; C. Aufderheide, builder.

Mrs. B. Branconier, two-st'y brick dwell.; cost, $2,700; A. McAllister, builder.

H. Fahiem, two-st'y brick dwell.; cost, $2,800; F. Knittel, builder.

P. Wiesse, two-st'y brick dwell.; cost, $2,900; F. Knittel, contractor.

St. Anthony School, two-st'y brick school; cost, $3,200; J. Rolfes, builder.

George Boller, two-st'y brick dwell.; cost, $3,500; Kledus, architect; J. Steffen, builder.

E. T. Hoffmann, two-st'y brick dwell.; cost, $2,500; Ramsey, architect; E. T. Hoffman, builder.

Washington.

Monthly Report. — The monthly report is 74 new buildings, and 159 repairs.

Building Permits. — The following permits have been issued since our last report: —

Cor. Eleventh and M Sts., s e, two-st'y brick store for J. T. Campbell; cost, $3,000.

Alley bet. Ninth, Tenth, N and O Sts., n w, two-st'y brick livery stable, 95' x 105', for Holmes & Thompson; cost, $5,000; D. B. Groff, builder.

New Hampshire Ave., bet. N and P Sts., n w, three-st'y brick dwell. for Mrs. C. L. Bishop; cost, $8,000; A. R. Duryee, architect; Jno. Sweeney, builder.

R St., bet. Ninth and Tenth Sts., n w, two-st'y brick church, to be known as "Mount Pisgah Church;" cost, $11,000; Robert Johnson, builder.

Seventh St., bet. L and M Sts., n w, two-st'y brick store and dwell. for Christian Wagner; cost, $3,500.

Columbia Heights, three-st'y stone dwell. for A. L. Barber; cost, $15,000; T. Chandler, architect.

Seventh St., bet. Q and R Sts. n w, 3 two-st'y brick stores and dwells. for Jno. M. Young; cost, $9,000; Cluss & Shulze, architects; Langley & Gettinger, builders.

B St., bet. Sixth and Seventh Sts., s w, three-st'y brick dwell. for W. E. Thompson; cost, $7,000.

G St., bet. Twenty-first and Twenty-second Sts., n w, three-st'y brick dwell. for Robert Reyburn; cost, $4,000; S. Plumley, builder.

LATEST.

Brooklyn.

Building Permits.— *Commercial St.*, n s, 300' e Bell St., nine-st'y gravel sugar refinery, gravel roof; cost, $60,000; owners, Havemeyer Sugar Refining Co., Greenpoint.

Eighteenth St., n s, 400' w Fifth Ave., 2 two-st'y and basement brick dwells., tin roofs; cost, total $8,000; owner, L. Lockman, Eighteenth St., bet. Fourth and Fifth Aves.; architect and builder, W. J. Conway.

Atlantic Ave., s s, 140' w Classon Ave., 2 one-st'y frame dwells., office and shed, tar and gravel roofs; cost, $2,300; owner, Estate of Abner Chichester, 318 Monroe St., New York City; architect, J. V. McKee; builders, McKee Bros.

Hancock St. s s, 250' e Lewis Ave., three-st'y brick tenement, gravel roof; cost, $4,000; owner, John T. Sullivan, Fulton St., cor. Reid Ave.; architect, J. Pettet; builder, P. Sullivan.

St. John's Place, s s, 222' 2' w Eighth Ave., 2 three-st'y brownstone front dwells., tin roofs; cost, each, $10,000; owner and builder, Wm. Johnston, 96 Taylor St.; architects, Parfitt Bros.

Broadway, s w cor. Willoughby Ave., 3 four-st'y and attic brick buildings; cost, $80,000; owner, Benj. T. Warner, 81 Morton St.; architects, Parfitt Bros.

Graham Ave., s w cor. Devoe St., four-st'y store and tenement, tin roof; cost, $7,000; owner, Charles Kinken, 302 Humboldt St.; architect, E. F. Gaylor; builders, J. McQuaid and Thoma & Wade.

Willoughby Ave., s s, 100' w Marcy Ave., 2 three-st'y brownstone front dwells., tin roofs; cost, each, $6,000; owners, architects and builders, Colson & Reiners, 81 Grand Ave.

Floyd St., n s, 81' e Marcy Ave., 3 three-st'y frame double tenements, tin roof; cost, $3,800 each; owner, Andrew Froelich, 202 Stockton St.; architect, T. Engelhardt; builder, J. Fuchs and Eich Bros.

Chauncy St., s s, 140' w Ralph Ave., 4 two-st'y frame dwells., gravel and felt roofs; cost, each $2,500; owner, architect and builder, Baldwin Pettit, 295 Chauncey St.; mason, E. Sutterline.

Commercial St., n s, 300' e Bell St., seven-st'y brick sugar refinery, gravel roof; cost, $40,000; owners, architects and builders, Havemeyer Sugar Refining Co., Greenpoint; mason, J. B. Woodruff.

Lafayette Ave., s s, 170' w Franklin Ave., 4 two-and-one-half-st'y brownstone front dwells., tin roofs; cost, each, $5,500: owners and builders, Lambert & Mason, 148 Putnam Ave.; architect, I. D. Reynolds.

Pacific St., s w cor. Emmet St., two-st'y brick stable, tin roof; cost, about $5,500; owner, E. C. Swift, Boston, Mass.; architect, A. B. Campbell; carpenter, B. F. Bailey.

Huron St., No. 179, n s, 150' e Manhattan Ave., three-st'y frame double tenement, gravel roof; cost, $3,800; owner, Jno. Davidson, on premises; architect, James Mulhaul; builders, J. Haford and Port & Walker.

Fifth Ave., n w cor. Fifteenth St., 2 three-st'y brick tenements, tin roofs; cost, each, $7,000; owner and architect, Geo. Ingram, 752 Fifth Ave.; builder, W. Corrigan.

Sackett St., Nos. 424 *and* 426, s s, near Hoyt St., 3 two-st'y brick dwells., tin roofs; cost, total, $8,667; owner, A. J. Dower, 380 Union St.; architect and builder, G. W. Brandt; mason, E. Sutterline.

Melrose St., n s, 175' from Central Ave., three-st'y frame double tenement, tin roof, cost, $3,300; owner, C. Gossman, Evergreen Ave., cor. Myrtle St.; architect, E. Schrompf; builders, G. Straub and F. Ringer.

PROPOSALS.

BRIDGE.

[At Lowell, Mass.]

Sealed proposals will be received at the office of City Engineer, City Hall, Lowell, **until 2 o'clock, of Monday, the first day of November, 1883,** for the temporary pile bridge over Merrimack River, below Central Bridge, Lowell, Mass.

The bridge to be removed from the river and adjoining lands within three weeks from the date of acceptance of the proposal. Bridge consists of forty-seven bents of six piles each.

The right to reject any or all proposals is hereby reserved.

Proposals must be marked "Proposals for Temporary Bridge," and addressed to

ROBT. J. THOMAS,
408 Chairman Committee on Streets.

IRON LIGHT-HOUSE.

[At Mosquito Inlet, Fla.]

Office of the Light-House Engineer,
Fifth and Sixth Districts,
Baltimore, Md., October 2, 1883.

Sealed proposals will be received at this office **until 2 o'clock, P. M., of Tuesday, the 16th day of October, 1883,** for furnishing the materials and labor of all kinds necessary for the completion of the metal-work of the Mosquito Inlet Light-house for the coast of Florida.

Plans, specifications, forms of proposal, and other information may be obtained on application to this office.

The right is reserved to reject any or all bids, and to waive any defects.

O. E. BABCOCK,
407 Major of Engineers, U. S. A.,
Light-House Engineer, Fifth and Sixth Districts.

THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT.

No. 16. SATURDAY, OCTOBER 6, 1883. VOLUME XIV. No. 406.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

BOSTON, MASS., September 1, 1883.

COURSE IV. — ARCHITECTURE.

THE President deems this a fitting occasion for calling attention to the course in Architecture in the Massachusetts Institute of Technology, which has been rearranged to suit the increased facilities for artistic as well as technical training now at the command of the Institute. By the coöperation of the other departments, the first-year studies, which are common to all departments, have been revised, so as to allow practice in the drawing of architectural forms to begin in that year, as soon as a moderate degree of skill in the management of drawing instruments has been acquired; and simultaneously with this is given instruction in drawing to scale, together with a somewhat extended course in Projections, preparing the student for the rendering of the problems in architectural design which he will take up immediately at the beginning of the second year, instead of the third year, as heretofore. Through this arrangement, and with the aid of an increased number of instructors, it will become possible to complete, by the end of the third year, the work in design which has heretofore extended throughout the course, leaving the fourth year to be occupied by projects of a more advanced character than have yet been attempted in the Department.

In addition to the work in architectural design, and as an assistance to it, an efficient training will be given in sketching, divided between exercises in water-color, under Mr. Ross Turner, and drawing in black-and-white. The lessons in color will be given out of doors in the pleasant season. Those in black-and white will be devoted chiefly to the drawing of detail, from the casts, both of architecture and sculpture, belonging to the Institute and to the Museum of Fine Arts; but students will be encouraged to form the habit of note-book sketching upon all occasions. In addition to these exercises, two evenings in each week during the winter will be devoted to drawing from the life; all students in the department who have attained suitable proficiency in drawing from the round being admitted to this class.

Instruction in the theory of Fine Art will be given by lectures, the students of the Department, by the favor of the Trustees of the Boston Museum of Fine Arts, being admitted free of charge to those given to the pupils of the School of Painting connected with the Museum, as well as to the use of the galleries; while, in addition to the regular courses, special lectures will be given every year in the Institute itself, by gentlemen distinguished for their professional attainments, upon the arts more immediately related to Architecture. For the next year these special lectures will constitute an extended course on the theory and practice of Decorative Painting, and will be given by Mr. Arthur Rotch and Mr. E. P. Treadwell.

Notwithstanding the increased extent and variety of the artistic work required from students, the study of construction, both theoretical and practical, will be not less comprehensive and thorough than before, and will be combined with actual experience to an extent not previously possible, the increased space at the command of the Institute giving larger opportunities for the handling of tools and materials. Regular visits to structures in process of erection will supplement this work, and will be continued throughout the course, the city and suburbs of Boston presenting an unlimited number of examples both successful and unsuccessful, for the illustration of points in heating, ventilation, drainage, acoustics, and the technical problems of plan and design, as well as matters relating more strictly to construction.

Not the least among the incidental circumstances which serve to assist the efficiency of the school should be counted the friendly interest which has been uniformly shown by the best architects in the city. For many years the Boston Society of Architects has made a liberal annual appropriation of money to be expended in prizes or other encouragements for the students or recent graduates of the Architectural course of the Institute, and its generous sympathy shows no sign of abating; while to the individual members whose courtesy there has been frequent occasion to invoke, the officers of the Department, as well as nearly all the young men who have been students in it, owe a debt of gratitude which is gladly acknowledged.

The Department of Architecture will remain under the charge of Professor Theodore M. Clark; Professor Létang, as before, directing the instruction in design. Mr. Edward F. Ely, a graduate of Brown University, and of the Architectural Department of the Institute, in the class of '82, and during the past academic year assistant in the Department of Applied Mechanics, has been engaged as Instructor in Architecture, and will have the general care of the drawing-room, under Professor Létang, giving also regular instruction in certain branches. The lessons in water-color drawing and sketching will be given by Mr. Ross Turner, who will also lend his aid in the organization of the evening Life School; and Messrs. Arthur Rotch and E. P. Treadwell will, as stated, be the lecturers of the year upon Decorative Art.

In addition to these instructors, the officers of other Departments prepare special lectures for the students in Architecture upon subjects which can be best taught in this way. Thus the lectures and explanations upon the theory and practice of Heating and Ventilation are given by Mr. Woodbridge, of the Department of Physics; and those upon Acoustics by Professor Cross, of the same Department. Parties in Field-surveying are also made up specially for the students in Architecture, under Professor Vose.

FRANCIS A. WALKER,
PRESIDENT.

GREAT IMPROVEMENT IN BLIND AND SHUTTER FASTENINGS.

THERE have been many devices for operating outside blinds, which, however, possessing little or no merit have been one and all discarded after a brief trial. There is, however, a thoroughly practical fixture, lately introduced for this purpose, called the "Dudley Blind and Shutter Worker."

The introduction of this new and useful contrivance for opening and closing outside blinds and shutters from within the house, without raising the window-sash, shade or screen, promises not only to revolutionize the old and crude method of reaching out to fasten and unfasten them, but also to check the rage for substituting inside blinds, which never can replace the former, inasmuch as they fail to prevent the heat entering the house, are expensive, are continually interfering with lace curtains, furniture or window bric-à-brac, and being an open receptacle for dust and cobwebs are a constant trial to housekeepers. Nothing is more annoying than for one to be compelled to raise windows in cold and stormy weather in order to open or close the blinds; wind, rain and snow enter the room, injuring curtains, furniture and carpets, and what is more, endangering the health of the inmates. It is obvious, and physicians all agree to the fact, that colds and bronchial troubles are oftener acquired by exposure to these sudden changes of temperature than in any other way. In summer, likewise, the necessity of removing the window-screens in order to get at the blinds is both troublesome and unpleasant. All of these difficulties are met and overcome by this shutter-worker, which is both ornamental and durable, and which works so easily that a child can operate it. By pulling or pushing a knob inside the

house the blind outside is correspondingly opened or closed; when open it is firmly fastened back against the house, and when closed it is as firmly locked and cannot be opened from the outside. It can also be securely set at any angle, so that where bay-windows are concerned the shutter-worker offers still another inducement. It costs but little more than ordinary blind fastenings, and is undoubtedly the cheapest in the end.

This fixture, covered by some half-dozen letters-patent, is the invention of Russell G. Dudley, of Jersey City, and is manufactured and sold exclusively by the Dudley Blind and Shutter-Worker Company, of New York City. It is endorsed by the Builders' Exchange of Brooklyn, and by many prominent architects in New York, Chicago and other cities of the Union, who are already specifying it in their plans. We congratulate the Company for having an article in which there is so little competition, and although not yet a year old is, according to appearances, an assured success.

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THE "PAINT PRESERVER."

There seems to be an indefinite idea with the profession in regard to the purpose of the "Paint Preserver," and it may be to their interest to have further light on the subject.

Forty years' attention to this subject with an earnest desire, based on the practical uses of paints, to improve upon old methods in their application, has not been without important results.

To say that pure linseed oil is the best vehicle to employ in painting is simply reiterating the idea of old painters before me, who made use of it in a fattened state for sign-painting only. They understood that therein lay a principle of exceeding great durability, but how to employ it in common house-painting remained a secret until the present time, when I had the honor of discovering it. No intelligent painter will deny its great value for that purpose over the ordinary or newly manufactured oil. To distinguish it I have very appropriately christened it the "Paint Preserver." Its strong adhesive power to attach any pigment, and to resist the combined forces of the elements, is positive evidence of a claim to its good name. The present system of painting the exterior of houses does no credit to either architect or painter, for in less than three years' time the owner complains that he was cheated in the painting of his house. Why? Because the paint rubs off at the touch. All three of the parties are innocent and excusable, because of ignorance on the subject of painting, but henceforth let not this excuse prevail after it has been shown how it can be prevented.

The "Preserver" in its natural state is transparent and dense as copal varnish, and should be applied first coat in its natural state, and for the second coat add about five pounds of ready-mixed paint to half a gallon of the "Preserver," which two coats form a perfect glossy surface; the next coat should be of paint reduced with one-third oil, and two-thirds turpentine, so as to produce a flat or dead surface. The finishing coat should be mixed, if in colors, half each mixed-paint and "Preserver," but if white, French zinc made ready for use, and one-fourth part "Preserver" mixed with it.

This formula has been carefully tried for eight years with such entirely satisfactory results as to enable me to guarantee its durability for twenty years, or longer.

I am aware of the opposition to be met with from painters and paint dealers, but as an earnest of my sincerity and confidence in the system I freely offer a *reward of five hundred dollars*, which I will pay to any party who shall show me a different plan as good, by any other method or vehicle employed.

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The attention of the public is called to this valuable product for chair and car seating and sundry other purposes. It is not altogether unknown to the public as a seating, its manufacture having been attempted in a somewhat crude form some years since. Meanwhile its durability has been put to the severest test, both in public places and in private dwellings, and with the most satisfactory results. Ample testimony is at hand to corroborate our statements.

"*Tough as raw-hide!*" For seating it has been used for ages the world over, as the traveller will testify as often as he recalls the time-honored, century-worn chairs; but thus far the hide has been used either in sheets or wide bands. Not until now has any attempt been made to manufacture raw-hide into a delicate strip (resembling cane) for weaving, by which an open, ventilated seat of great strength and durability is secured.

For constant use no seat is so healthful or so comfortable. This is the verdict of physicians as well as the experience of the public generally. The preference now given for the various open or perforated seats speaks loudly for such seating, as shown by the enormous market which has been created for them both at home and abroad.

No attempt is herein made at comparison. We simply contend that a seat of raw-hide strip weaving is the strongest woven, open-ventilated seat in existence. Besides strength it has elasticity and beauty, and with its parti-colored weaving it commends itself as a seating for the better class of chairs, above that of any article in use. Neither is any attempt made to compete with cane or other seating. It is a better article and fills a need not yet met by any other manufacture. Wherever a durable, open seat is demanded or desired, the raw-hide strip must eventually take the place of all other woven seating.

For Car Seating, it is the strongest and coolest seat for summer travel, and in mild and hot climates the only proper article for constant use.

It overcomes the objection made to the use of cane, in that it is durable, open and ventilated, elastic enough to counteract the jar, and affords a hold on the seat sufficiently secure to prevent the slipping forward, which is so uncomfortable upon the closely-woven cane seat.

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The following work is now progressing and under contract:—

Hoffman House, extension, Twenty-fifth Street, New York City; Mr. John B. Snook, architect. Brooks Brothers, store, corner Broadway and Twenty-second Street; Mr. C. C. Haight, architect. New York, West Shore & Buffalo R. R. Co.'s terminal station, Weehawken, N. J.; ferry-house, West Forty-second Street, New York City; depot at Canastota, N. Y.; depot at Mohawk, N. Y.; depot at Frankfort, N. Y.; depot at Cornwall, N. Y.; and union depot, offices and hotel, Buffalo, N. Y., and all other stations on this line requiring drainage. A. J. Drexel, Esq., residence, Thirty-ninth and Locust Streets, Philadelphia; Mr. T. Roney Williamson, architect. Henry R. Kibbe, Esq., residence at Somers, Conn.; Mr. E. C. Gardner, architect. William H. Vanderbilt, Esq., two residences, Fifth Avenue, and Fifty-fourth Street, New York City; Mr. John B. Snook, architect.

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NOTES.

Messrs. E. T. Weymouth, C. N. Marcellus, and W. Blondel have associated themselves together under the name of the Universal Steam-Heating Company, of New York City. Mr. Weymouth has long been known as an authority in all matters pertaining to steam heating, and, although the firm has been but a brief time in existence they have completed several large contracts, and been awarded the contract for heating the eight-story apartment-hotel of Edward H. M. Just, corner One Hundred and Twenty-second Street and Seventh Avenue, New York. The office of the above firm is No. 13 W. Vandewater Street, New York City.

IMPORTANT PATENT SUITS.

New York, September 10.

Important suits have been entered in the United States District Court by A. L. Bogart, of 22 Union Square, against Mitchell, Vance & Co., Charles H. Hinds, Smith, Bridge & Co., the Electric Supply Company and others. They are suits in equity for infringements of patents held by complainant, covering a frictional electric machine and electric gas burners used in the lighting of gas-jets in *multiple*, as well as every variety of apparatus and burners now in general use for lighting gas-jets *singly* by electricity.

If these patents are held to be valid it will give the complainant a monopoly of the manufacture of these popular and valuable appliances in the United States.

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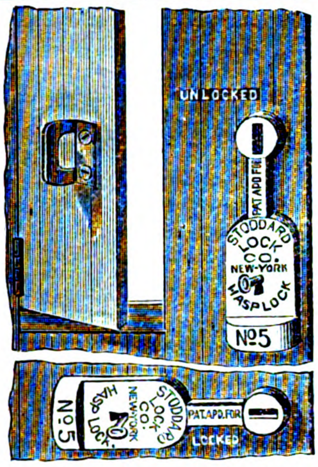

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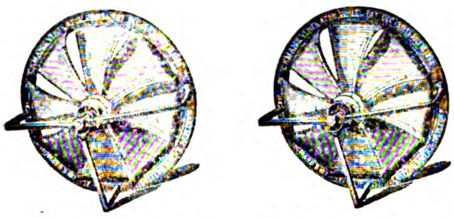

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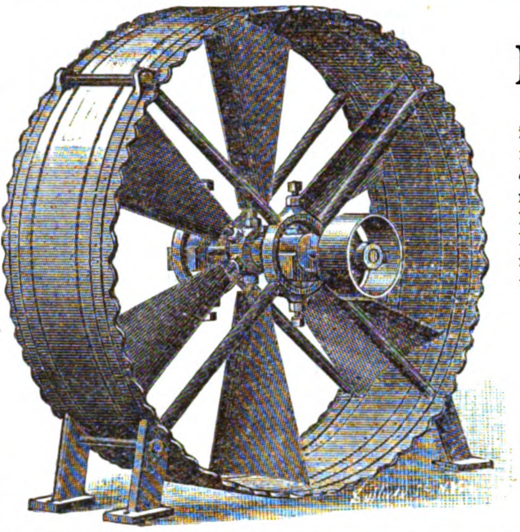

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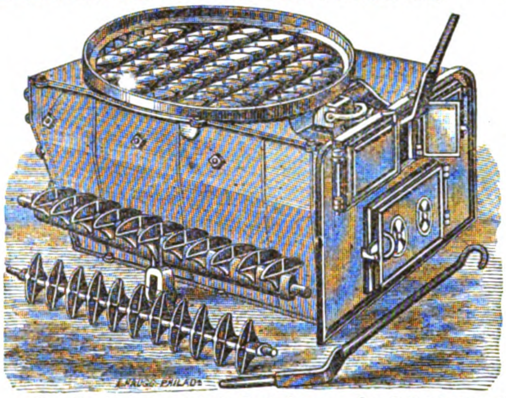

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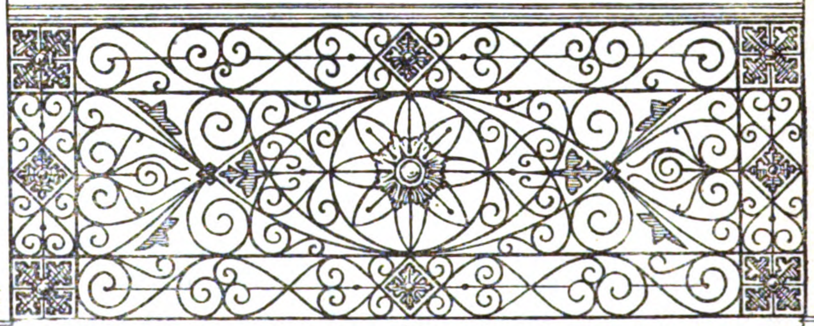

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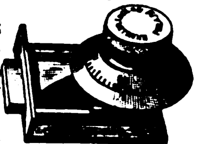

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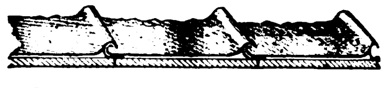

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

MR. BENJAMIN S. ROTCH, of Boston, who died very suddenly a year ago, had during his lifetime formed an admirable project for encouraging the study of architecture, an art in which he took a great and intelligent interest, by offering to students and draughtsmen, as an incentive to special exertion, an annual prize, to take the form of a sum of money large enough to pay the cost of a year of travel in Europe. No plan for carrying his intention into effect was, however, formed, and at the time of his death, the matter had assumed no more definite shape than that of a benevolent scheme, to be further developed at leisure. At the settlement of the estate of the deceased gentleman, his children, knowing that this particular fancy had been much in their father's mind, formed the idea of carrying it into effect, in the manner that they thought he would have wished, with a portion of the property which they received from him; and as soon as a satisfactory plan could be arranged, and the necessary legal formalities complied with, they joined in executing an instrument of gift surpassing, if possible, in thoughtful generosity the kind intention to which they were endeavoring to give effect.

THE deed, as finally executed, assigns in trust forever to three persons, as trustees, property sufficient to yield an income of two thousand dollars a year, and from the income of this fund not one, but two, young men are to be constantly maintained as travelling students of architecture in Europe, the award of the studentship being made annually, and each successful candidate holding it for two years. By a provision which, considering all the circumstances, must be called a wise one, the privilege of competing for this studentship — the most brilliant prize, with the exception of the Prix de Rome, offered to young architects in any country — is restricted to students or draughtsmen in offices in the State of Massachusetts, and no one can be a candidate who has not spent at least two years in the office of a practising architect, this amount of experience of actual professional work being justly regarded as essential to the most intelligent appreciation of the architecture of other ages and countries. The details of the examination which candidates must pass, and of the work to be required from the beneficiaries of the fund, are not yet settled, but the Boston Society of Architects will coöperate with the Trustees in regard to these points, and the first examination and award will take place during the coming winter or spring.

IT is impossible to over-estimate the future influence for good in the profession of this most noble and thoughtful gift. To say nothing of the opportunity for artistic improvement which it will open to poor young men of talent, the very fact that the prize is a public one, to be secured by any one, well grounded in first principles, who has the industry and perseverance necessary to win the highest place, will make it the object of an emulation which, although success may fall only to few, will in itself bring nothing but good to those who may be stimulated by it to energetic efforts at improvement in their chosen profession; while even the older architects will share in the interest of their pupils or assistants, and will find themselves renewing their youthful enthusiasm in the discussion of the merits and prospects of candidates or the *envois* of the year. As compared with the great French prize, moreover, we cannot help thinking that the American possesses a certain advantage, as being the offering of private, rather than public liberality. Undoubtedly, the Prix de Rome carries with it that fame which the French know so well how to confer upon those who win success, but the young Massachusetts architect who goes forth from home as the winner of the Rotch prize will find, we imagine, his ardor for gaining further distinction for himself and his country rather increased than diminished by the personal interest which his career will have for the family and friends of the founders, and there are few, we think, capable of gaining such a prize, who would not feel it to be for them, in a certain sense, enhanced in value, as having been the offering of filial affection.

THE origin of the disastrous conflagration which destroyed in a few minutes the other day the buildings of the Pittsburgh Exposition, with all their contents, has been explained by a theory which is, to say the least, very plausible. It seems that Mr. Warner, the aeronaut, having an ascension to make, spent the day before the fire in repairing his balloon, and in revarnishing the canvas of which it was made with boiled linseed oil. As the most convenient place for his work, he chose the boiler-room, and after the varnishing was complete, the balloon was rolled up and put by to dry. A more reckless operation than this it would be difficult to conceive, the warmth of the room, the rolling together of the canvas, and the boiling of the oil, all conspiring to make the spontaneous combustion of the inflammable mass almost inevitable, and the opinion of the Pittsburgh Fire Marshal will be concurred in by every builder, architect, insurance agent and painter's apprentice, that the result was simply what ought to have been expected under the circumstances. The only thing that could have made the canvas more certain to take fire than simple saturation with linseed oil would have been to sprinkle it with water before rolling it up, but this is by no means essential to the effect. It is, however, a very common factor in the cases of spontaneous combustion which occur every week or so. Some uninstructed person, having been engaged in painting, or polishing wood-work, undertakes to save the cotton rag which he has been using by washing out the oil or paint, but after one or two trials, finding this a rather difficult operation, abandons the attempt, and rolls up the rag in a knot, and throws it into some corner, where the oil and water speedily react upon each other to set the whole in a blaze.

A DISPUTE, if not a small quarrel, has arisen in Boston in regard to one of the statues in the remarkably pretty collection of sculpture which forms a part of the Foreign Exhibition in that city. Among the statues is one, numbered 218, and catalogued as a figure of Victory, by Professor Tommaso Lazzerini, and dedicated to the American nation. It is not very evident why a statue of Victory should be dedicated to the American nation, but most people would suppose that some sort of compliment was intended, and accept it as gracefully as might be. Mr. J. R. Koehler, however, a connoisseur of the city, not being, apparently, as easily soothed by inexpensive flattery as most people, after inspecting the statue wrote a note to the *Daily Advertiser* asserting that the Victory was a barefaced copy of one of Rauch's Victories in the Walhalla at Munich, and expressing the opinion that the dedication of a fraud to the American nation should be considered an insult rather than a courtesy. This note called forth an answer from Mr. James Jackson Jarves, to whose exertions the managers of the Foreign Exhibition owe the collection of a large and attractive part of the objects which they show, merely saying that the sculptor of the Victory, Professor Lazzerini, held a high position among Italian artists, and that the statue in question was modelled many years ago. Further than this he did not pretend to enter into the merits of the case, but had sent the newspaper article to the sculptor, for his own comments. The rejoinder of Mr. Koehler to this letter reiterated his assertion that the statue was a reduction of a figure well-known throughout the artistic world, and referred to pictures of it in books easily accessible, so that any person might judge for himself of the

imitation. Whether any one except Mr. Koehler has yet done so we do not know, but it is not unlikely that the incident may serve to bring up some details of sculptors' ethics in a way which will prove very useful.

THE Philadelphia *Bulletin* makes a comparison of the returns of building operations in the various cities of the country, which furnishes some surprising results. Few people, for instance, we imagine, will be prepared to hear that, as to the number of buildings erected, St. Paul, Minnesota, was last year the most active city in the United States, and, we are inclined to think, in the world, four thousand new structures having been registered there during the past twelve months, while Philadelphia, the next in order on this side of the ocean, shows only three thousand three hundred and thirty-four. In New York, where, it is true, the size and cost of buildings is greater than in any other of our towns, the number last year was nineteen hundred and five, or less than half that of St. Paul. Boston, although presenting a steady rate of building, is, in respect to actual number of structures, very low on the list, having been during the last three years considerably surpassed by the new town of Topeka, Kansas, and for the past year by the still newer village of San Antonio, Texas. Even Salt Lake City, which to the ordinary mind presents itself as an encampment of fanatics on the border of a desolate pool, constructed last year four hundred buildings, or a third more than New Haven, and nearly as many as the busy town of Newark, New Jersey. In 1881 and 1882 the number of buildings in New York very nearly reached that recorded in Philadelphia, a fact which sufficiently illustrates the great relative prosperity of trade there during that time.

THE *Sanitary Engineer* mentions an interesting example of sewage utilization, as practised at Buntzlau, in Silesia. Buntzlau, although a place of only about seven thousand inhabitants, enjoys the distinction of having been the first town in Germany, and perhaps in Europe, to introduce a public water-supply, and with it a system of sewerage and sewage disposal by irrigation. The first houses were built late in the twelfth century, and their number increasing rapidly, advantage was taken of the circumstance that some fine springs existed on a neighoring hillside to draw from them a supply of water, which was carried in wooden pipes to the town, and distributed to many of the houses. The introduction of an abundant supply of pure water in the mediæval village soon brought with it, as it does everywhere else, the need for an efficient system for disposing of the waste liquids, which of course equalled in amount the original water-supply, and as the open ditches first dug for carrying away the drainage soon became offensive, underground sewers were substituted for them within the city limits. Beyond these limits the ditches were retained, and extended to a final outfall into the river Bober, a mile or so away. Between the city and the river, however, were cultivated meadows, and the farmers soon took the liberty of diverting the sewage from the ditches to increase the fertility of their land. The period when this practice was first begun is not definitely known, but the advantage possessed by the Buntzlau farmers in being able to irrigate their fields and gardens with the sewage is mentioned in a chronicle dating back to the year 1538, and to this day the same meadows are still irrigated in the same manner. In 1559 the irregular and unauthorized appropriation of the sewage was terminated by the adoption of a comprehensive scheme for irrigating the meadows below the town on a large scale. All the street-wash and roof-water of the town was turned into the sewers, but even with the aid of the rain-water the supply of the fertilizing liquid ultimately became inadequate to the demand, and in 1748 a town meeting was called to adopt a weekly schedule, by which each farmer was allotted the use of the sewage during certain hours of every week, the weekly period of irrigation for each customer varying from two to twelve hours. Within the present century the system of distribution has been improved, and iron pipes have been substituted for the old wooden ones, but the principle of disposal is unchanged. The irrigated area, so far as can be judged from the small map accompanying the description, now amounts to about one hundred acres, of which forty-two acres are devoted to market gardening, while the rest consists of meadow, in which, however, many fruit trees are planted. The subsoil is gravelly, and although there is no attempt at underdrainage, the ground, after nearly three hundred and fifty years of constant irrigation, has never shown any sign of saturation. The sewage is distributed in open carriers, through the winter as well as the summer, and its efficacy as a fertilizer, diluted as it is, may be judged by the fact that four or five crops of grass are cut every year. The interest which attaches to this experiment, which may certainly be considered to have attained a substantial success, is increased by the fact that the latitude of Buntzlau is substantially the same as that of the southern part of Hudson's Bay, and its irrigation fields, although not perhaps exposed to so rigorous a climate as those of Dantzic, are perhaps at least as unfavorably situated in this respect as would be those of any town in the United States.

THE great earthquake on the island of Ischia has been the occasion of much scientific discussion, and some theories in regard to such occurrences have been brought forward which will probably be new to most of our readers. The particular catastrophe at Ischia is generally considered to have had a mixed character, the sinking of the ground, with the consequent destruction of life and property, appearing to have been due to the collapse of the earth over vast subterranean cavities, which had probably been in process of excavation for ages by the solvent action of the hot mineral springs of the region, but remained concealed under the crust of the surface soil until a comparatively slight volcanic shock disturbed the cohesion of this, and threw the whole in ruins into the abyss beneath. Many circumstances support this view. Among others, the sharpness of the boundary which circumscribed the scene of the catastrophe has attracted the notice of all observers, and suggests at once the sinking of the crust over a concealed cavity. One house is said to have been torn into two parts, one of which remains intact, while the other is in ruins; and in the dormitory of the paupers' lodging-house a row of trestles which supported the heads of the cot-beds was found still in place, while the corresponding trestles which sustained the feet were mingled with the heap of débris below. The suddenness of the crash, which is shown by the attitudes of the bodies taken from the ruins, also indicates a collapse, rather than a shaking of the ground. Most earthquakes are preceded by warning movements and noises, and the bodies of those who fail to escape are found afterward in positions indicating flight, but at Casamicciola the corpse of a woman was found with the yarn of her knitting work still looped around her finger, and a shoemaker with the waxed thread which he was drawing through the leather still grasped in his hand.

VERY little evidence of mental agitation or fright was discovered, and death seems to have come to the victims as an instantaneous shock, few of them showing even the signs of suffocation or of bruises from falling objects. One of the most noted physicists of France, M. Flammarion, takes occasion in speaking of this earthquake to remark that many, if not all, very fatal catastrophes of the kind have probably occurred in a similar way. The old theory of the internal fires of the earth is, as he says, now generally discredited. It is true that the temperature of the earth rises for a certain distance below the surface, but the rate diminishes with the depth, and the maximum temperature is probably reached at a mile and a half or so from the surface. Below this, as the form of the earth, the precession of the equinoxes, and many other phenomena indicate, the mass of the globe is solid, or at most slightly plastic by reason of the enormous pressure at every part. If there is no subterraneous fire beneath our feet, there is certainly no need of breathing-holes to give vent to the terrestrial flames, and the ancient theory which regarded volcanoes as safety-valves for the Titanic furnaces is as devoid of foundation as that which attributed the throes of Ætna to the struggles of the imprisoned Enceladus. Volcanoes, however, exist, and need to be accounted for in some way, so M. Flammarion explains the phenomena which they present by the theory that they indicate chemical action in the substance of the earth below them, caused generally by the infiltration of water, which, coming in contact with oxidizable substances, produces at great depths, and under immense pressure, the phenomena characteristic of violent oxidation. In support of this view it is observed that all volcanoes now active are situated directly upon the sea-coast, and all known extinct volcanoes are either near the sea, or on the borders of what were once large bodies of water.

SPANISH ARCHITECTURE.[1] — I.

A TOUR through Spain is as interesting a journey as can be taken in Europe. The traveller, be he architect, artist, historian, or ethnologist, or simply an appreciative and observant tourist, can find in Spain that which is lacking in every other country of Europe; namely, freshness. If he leaves the well-known Andalusia, and travels north and west he can find things and people of which and whom he has not read in books until they are familiar; architecture of which he cannot get photographs, unless he takes them himself, and, a little off the usual routes of travel, people who have not seen a foreigner since the Duke of Wellington's campaigns there.

There is very much to see in Spain. The land of some of the richest history and legend of Europe, it is full of the records of its past. The field in ages long gone by of race struggles of Aryan and Semitic man, later the turning point of the great advancing tide of Mohammedanism, when Christian and Paynim met and fought, not for sentiment and religion only, as in the Crusades, but for the soil and its fruits; later yet, Spain, the already world-renowned for learning and refinement and wealth, for a time nearly monopolized the exploring and despoiling of the wondrous wealth of the New World; and still nearer our own day this land was the stage whereon the terrible Inquisition performed its tragedies in the name of religion.

And all these happenings have left their marks. The cities and the people, their language and habits, have incorporated in them such inheritances of all that eventful past that were no writings extant, the student could almost construct a history from the things as they now are. But the change has begun. Spain is rapidly being modernized, and railways and the telegraph and travel and literature are quickly bearing fruit and effacing that presence, as it were, of the past, which is so charming although it is the evidence of stagnation or decadence. While it remains let those who can go and see it, in the most fascinating land for travel that progress-jaded men could wish for. There is the quaintest mixture of the luxurious civilization which France claims to typify, and the semi-barbaric Oriental indifference, to be found purer in Morocco, which is not far off, almost as near as France. Madrid is almost like a French city, while Toledo, hard by, might be in Africa for strangeness.

Travelling is now perfectly safe in Spain. The evils of misgovernment and civil war and brigandage, which till lately made travelling for pleasure out of the question, are fading away. Hotels, as we understand the word, are few indeed; but necessaries can always be had, and often with primitive Old World circumstances very interesting to the traveller of good digestion and contented mind. Men of this kind, only a few as yet, and only the hardiest of the fair sex, are exploring the country with delight even in their discomforts, and soon enough will be known and written to rob travelling of the charm of exploration. Soon Leon and the Asturias and Galicia will be as much frequented and as little surprising, as now are Andalusia and Granada. There are very great differences between the various provinces — the old kingdoms — of Spain and nearly all our ordinary ideas of what is Spanish are obtained from Andalusia. The route by Cadiz and Seville to Granada is well trodden and well recorded, but this no more constitutes Spain than Georgia does the United States. In the interior are the things to be seen. Painters will continue to make studies and pictures of all the old well-worn subjects in Venice and Rome and elsewhere, and beholders will welcome in them the slightest freshness in treatment, atmosphere, color, any new way of telling the old story, but he who will go to Spain will have a new story to tell, many indeed, and so rich that though his telling be faulty, he may hope to get some attention.

In this belief the writer ventures to unfold his tale and his portfolio to brothers of his profession, without vanity and without apology. There is little yet done toward recording the interesting architectural treasures of Spain. The works of Don Juan A. Cean Bermudez (1829), of Don F. J. Parcerisa (1844), of Don G. P. de Villa Amil (1842), are good; indeed, Parcerisa's is excellent if we take into consideration its date and aims, but now, and for our own desires, they are all wanting in most essential things. A commission created by the Spanish Government is preparing and publishing a most ambitious, but, so far, unsystematic and unavailable work, "The Architectural Monuments of Spain." It is far from complete yet, or even from being usefully advanced. In the English language the book by Richard Ford, F. S. A., best known as "Murray's Hand-book for Spain," has much information not to be despised, and the "Gothic Architecture in Spain," by George Edmund Street, A. R. A., is a valuable work, which, so far, stands above all for its excellence, although there are some others of value. It was as a respectful pupil and admirer of this master in architecture, so admirable both in his own work and in his devotion to his office of Professor in the Royal Academy, that the writer, when he found the fitting opportunity in obtaining the Travelling Studentship of the Academy, resolved first of all to visit Spain, and add some little contribution to the work which Mr. Street had practically commenced. The drawings for this purpose have been usually made from subjects not illustrated by Mr. Street, or when it seemed desirable to follow closely in his footsteps, (and sometimes it was unavoidable by reason of the beauty of the subject,) then at least a different point of view was chosen so as to add to, rather than compete with, what was done before.

Nearly all the illustrations are fac-similes of pen-and-ink drawings done deliberately on the spot; two or three are redrawn from water-color sketches; and whatever they may be otherwise, they are all conscientiously correct architectural drawings.

ANDALUSIA.

It is good to see Andalusia first of the provinces of Spain. This is the land of our Spanish ideals; the European home of Oriental grace and romance and luxury. Here a poetic, ease-loving southern people, retaining yet many habits and sentiments taught them by the Moors, live in a luxuriant country with a glorious climate; live so easily that to exist is almost enough to do. Necessity is not very stern in this corner of the earth and the Andalusian's labors are regulated accordingly. He has abundant time at his disposal to compensate for a minimum of energy, when work is in question. But withal, he can be bright as his native sunshine, and handsome and lithe as he is gay; and if bull-fighting or other sports are afoot, he will prove that his indolence is of the spirit rather than of the body; for Andalusia is the home of the arena and the dance as well as of Moslem indifference and procrastination.

Approaching Spain at Andalusia and Andalusia by Gibraltar we see first those things we have been led to expect. Steaming up from the rolling wastes of the Atlantic into the Straits, with blue distant shores on either hand closing in nearer and nearer, and rising bolder and higher, till they stand opposite each other in forbidding mountain peaks, are the pillars of Hercules. One can sympathize (if circumstances are propitious) with the ancient heroes who feared to pass these ends of the earth; for at times these mountains are wreathed with thunder-clouds and rain-mists; and winds sweep down their sides and across the narrow seas, wildly enough to justify the fears of the superstitious mariners in their diminutive ships. The waters, too, boil and eddy between the great sea and the greater ocean in the strangest way; of small account, perhaps, to modern mariners who understand the meaning of it, yet mysteriously enough to afford food for reflection, even when seen from the deck of an iron steamer.

There on the right is Africa—the "Dark Continent." Its nearest shores, the city within sight upon the bay, and everything there are as different from things European as if a thousand leagues instead of a short mile or two separated them. On the other hand is the Spanish land of promise for which we are bound, and in front, standing independently in the sea, almost a separate island, the steep-peaked Gibraltar bears the flag of another race; and its little town lives a life different again, although not altogether English. There is very much that is interesting in this locality, and greatly varied in its interests, too, so that architecture is apt to be neglected for a time even by the most devoted students, and in truth there is not much architecture to study. But here I left the Peninsular and Oriental steamship "Poonah" and began my wanderings, and the first impression was so pleasant and lasting as to warrant a line or two here. "The engines stopped, the anchor fell, dragging out the rumbling cable, and starting us up from the dinner table, where we had been lingering expectant, and we all hurried on deck. The view agreeably surprised me. The storm had ceased, and there was just enough light to show in silhouette the bold, dark ridge of the rock, black against the sky, hard and distinct, towering up into rugged crags aloft, and looking like some such sleeping sea-monster with spike-studded backbone as the Goths and Japs loved to imagine; much, in fact, like a gigantic whale with the spinal appendages; and the clouds in great broken masses driving across the sky behind, made such a scene that one looked around for the battle or wreck which should be in the foreground to complete the picture consistently; but all along the base and lowest slopes quiet twinkling lights, and dim outlines, and faintly-seen white walls showed where the town lay peacefully, in tiers and terraces, behind its two miles of fortified sea-wall. I stood and enjoyed the scene till the Gibraltar boats swarmed around, and their crews made that din and confusion which all Mediterranean boatmen love; and then we landed and entered the English fortress by drawbridge and portcullis, real enough to convince us that peace was not always mistress of this lovely spot of earth. Gibraltar is not a barren precipitous rock only. True, the rock is there, with the world-renowned galleries and chambers honeycombing its cliffs, but the exterior of even this part is decorated with wild flowers and grasses, lodged wherever they can find root-room in crevices and on shelves, and all along the western base semi-tropical vegetation beautifies the land; cactus, prickly pear, and palms and geraniums in big shrubs, and many flowers greeted my explorations of the next day."

But Andalusia and not Gibraltar was my object, and is now my subject. After a well-remembered trip to Morocco across the straits, and a pleasant day or two in ancient but modern-looking Cadiz, I at last reached Seville and began work, and pleasant work it proved to be. I wandered out in the genial sunshine (it was early April,

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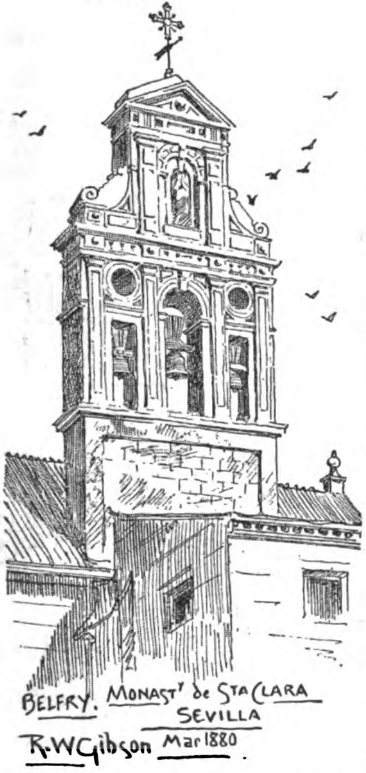
[1] By Robert W. Gibson, Travelling Student of the Royal Academy.

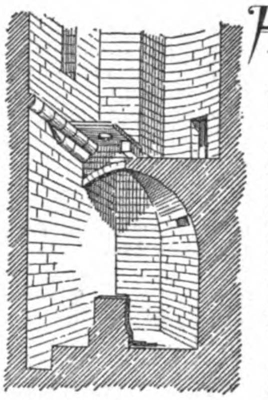
and I had left cold and storm at home), and soon found the cathedral and its beautiful tower, the Giralda. It is square and massive, rising simple and grand, the decoration not disturbing the dignified outline, but encircling the surfaces of the walls with delightful variety of window-arch and wall-tracery up to the first cornice, one hundred and eighty-five feet from the ground. This is the work of the Moors, of their renowned builder, Abu Jusuf Yakub, who, in 1171–1196, raised the great mosque of which this is the principal remaining feature. The belfry above is Renaissance, but it is a very happy completion in general conception, and, indeed, its well-proportioned columns and cornices, relieved with many a terminal and balustrade, harmonize wonderfully with the lines of the more ancient work, although so different in character of decoration. It is more than probable that the Moorish termination of the tower was something like it in outline, not only because the original top was moved away to give place to the present one, but by comparison with some other Moorish towers of similar type which remain as first built. The Giralda tower is about forty-eight feet square externally, and is ascended by means of inclined planes, like those in the Campanile at Venice. Its name is derived from the gyrating figure in bronze which crowns the belfry, said to be fourteen feet high and to weigh twenty-five hundred-weight. The manner of hanging the bells is noticeable; the cross-head is pivoted between the piers of the external wall, the bell hangs in the arch or window as the case may be. It is balanced by a ponderous counter-weight of wood and metal above the cross-head, so that with a few swings the ringer can give the bell impetus enough to turn completely over. This is not a bad plan when one bell is in question; a little push at each revolution applied at the right moment, and with due regard for one's personal safety, will keep the bell going over and over with a rhythmic ding-dong. But the Spanish bell-ringer too often displays his dexterity by starting up three or four and even five bells at once, running from one to the other to administer a shove to the flagging one. They are usually approximately in tune, but their rates of oscillation and revolution bear no discoverable relation to one another, or to anything else in creation, except, perhaps, the seemingly irregular movements of the ringer, and for this reason the time is—well, "bad" is a weak word for it; generally there is no time at all, but only a clatter-clang-dong as broken as the banging of a kettle in tow of an insulted dog. Some of the bells are so degraded as to have a rope which coils *several* times around the cross-head, and being hauled in, gives the complaining bell a dizzy speed, strong enough to recoil it as many times the reverse way; a new element of variety in time is introduced thus, for the motion is not only independent of that of the other bells—it quickens and slackens in itself. It was novel, and for a little while interesting, but at times it produces more noise than music.



The exterior of the cathedral as seen from the streets is not very impressive. It is of many periods and styles, and therefore has little unity of expression, and misses, too, the charm of picturesque contrast which such mixtures sometimes attain; yet there are some "bits" which are beautiful, taken separately, and much that is worthy of study for expressive details in the later Gothic styles. The interior is grand enough to justify its reputation in that respect, but its grandeur is so well recorded already that further repetition would not be in place here; suffice to say that my impressions were chiefly of its size, of some glorious stained-glass, and, most, of that almost indescribable aroma of an ancient and powerful and self-glorifying religious temple, a strong sentiment impregnating the very stones with its quality, and commanding respectful approach. This, strangely enough, seems to belong to some buildings and be absent from others, independent of architecture or decorative arts, or even of religion pure and simple, and Seville gave me that impression quite apart from my observations architectural. I heard that they are very intolerant of Protestant curiosity there; a lady had been ignominiously expelled for venturing to sketch some admired bit of ornament the day before, so as there was plenty to do elsewhere, and little time at my disposal for Seville in any case, I did not try to commence my pictorial labors inside. I walked round to the north side by the terraced foot-way, and found the old arch leading to the court-yard or "*patio*," the old court of the great mosque which preceded the cathedral. There is some of the work of the Moors about this part yet. The court is situated much as the cloisters are in some other places, between the cathedral proper and certain ecclesiastic buildings which stand upon the street. It is a charming retreat for the sketcher. The orange trees from which it takes its name, "Patio de los Naranjos," are luxuriant, and in their shade in the centre is a plashing fountain, with, usually, two or three picturesque children or idlers about its circular basin. On one side stand the transept and walls of the cathedral, rich in deep shadows, and picturesque in sky-line of pinnacles and traceried parapets, and best of all, at the end, far enough away to be comprehensively seen, rises the grand old Giralda tower. To describe its appearance here I made my sketch (*see Illustrations*), which is perhaps better than words, and that done I made another note of the flying-buttresses of the nave, because they seemed to me to be a very good example of the exuberance of detail of a late style properly subordinated to good expressive constructive forms, a somewhat rare quality in advanced Spanish Gothic. The way in which square angles are broken back into diagonally placed pinnacles, and the combinations of gablets and crockets upon them are very good, and there is enough plain wall-surface, and enough solid, heavy arch in the buttress itself to satisfy the desire for stability, apparent as well as real.

SANITARY PLUMBING.[1]—V.

THE VALVE AND PLUNGER CLOSETS.



A FEW years ago, before systematic ventilation of the sewers and soil-pipes became universal, it often happened that a back-pressure from the sewers occasioned by rising tide, adverse wind or other cause, forced the sewer-gas through the water-seal of the trap in bubbles. A tight-fitting valve or plunger in the trap might, under these circumstances, have served a good purpose in resisting this back-pressure, and as valve-closets were at first built without overflows the valve or plunger performed an actual service in resisting, in a measure, the entrance of sewer-gas.

Now, however, the circumstances are altered. It is found that an overflow is necessary in these closets, and this overflow-passage is rarely provided, like the trap, with a valve or other mechanical closure. Hence, any gases which could pass an ordinary water-seal could pass through these closets by way of the overflow-passage quite regardless of and quite as easily as if the valve or plunger in the trap never existed. Moreover, the ventilation of the sewer and soil-pipes renders back-pressure impossible, so that the only useful office which the valve or plunger could perform in relation to sewer-gas is no longer called for.

The valve and plunger evidently cannot prevent the loss of the water-seal from siphonage, momentum, evaporation, or suction, even where the overflow passage is closed by a ball, as is the case with some of the Jennings[2] valve and plunger closets; for siphonage, momentum and suction act in the direction in which the overflow-ball or valve is opened, and evaporation is chiefly due to the trap ventilation-pipe. Moreover, the tightness of a valve or plunger against its seat can never be implicitly relied upon. They are always liable to leak, and could never be fitted with such microscopic accuracy as to prevent the passage through the minute openings which exist between the particles forming the valve and its seat, of any micro-organisms—the bacteria or disease germs, or their spores—which might be in the water.

The only object of the valve or plunger, therefore, is to retain a certain quantity of water in the bowl to receive the waste matters, and prevent their striking the dry surface of the closet-bowl to which they would adhere, and if it can be shown that this result can be accomplished equally well without them, and by simpler means, it is obvious that they are utterly superfluous.

The efficiency of the large body of water suddenly emptied from the bowl for flushing the water-closet is destroyed by the obstruction of the valve and plunger themselves, and their machinery. The drains and soil-pipe can be equally well flushed without them.

The receiver or container of the valve and plunger is open to the same objections as that of the pan, differing only in degree, and the overflow-passage, not required in the pan-closet, forms a second filth collector, and increases the complexity and cost of the apparatus. The sudden discharge of the larger body of water in the bowl is very liable to empty the trap below by its momentum and siphon action, leaving a free passage-way for the entrance of sewer-gas into the house, requiring a special provision to be made for its automatic refilling.

These and other considerations have led sanitarians to express themselves very differently as to the relative merits of the pan, valve and plunger closets, though there is no sufficient reason why, after a thorough examination of the subject, such difference should exist. Were they agreed in their views, their unanimous testimonies either

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[1] Continued from page 150, No. 405.

[2] These, and the "Eclipse" and the Bower plunger closet, are the only closets in the market known to the writer, in which the overflow is provided with anything more than a simple water-seal.

way might be accepted by the public in faith as sufficient. As they are not, the facts should, if possible, be so clearly presented that any reader may easily decide for himself. The great importance of the subject is a sufficient excuse for the space such a careful analysis occupies.

THE VALVE-CLOSET.

Valve-closets are those which have the outlet of the bowl closed by a movable valve or plate, usually held in place by a lever or spring.

Figure 2 represents a valve-closet having the trap below the floor.

Figure 3 represents a valve-closet with trap above the floor.

Figure 4 represents a valve-closet with a ball in the overflow.

These are among the simplest and best of their class, and may be considered as types or standards. All others differ from these merely in slight and comparatively unimportant matters of detail. Some valve-closets are made without water-traps below the valve. These are totally unreliable, as no valve has as yet been discovered which is not liable at some time to leak, especially when used in water-closets. Beginning as before, with *the flushing*: —

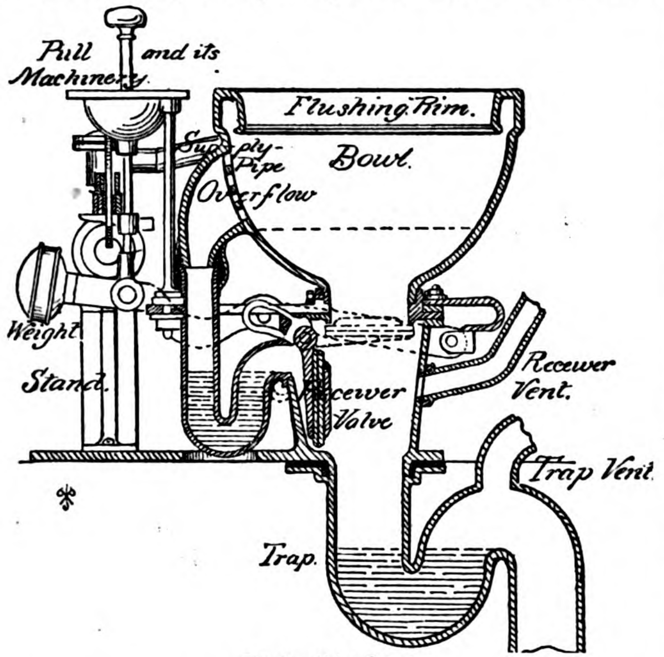

Fig. 2. — Valve-Closet.

(*a*) We see, by examining the drawings, that the cleansing effect of the stream can never reach those parts of the receiver which lie behind the valve and around its hinge, nor any part of the overflow passage. Hence, these parts are sure, sooner or later, to become foul, and they are exactly the parts in which foulness will impede the proper working of the valve and closet, and occasion leakage of the water from the bowl. The receivers of both the pan and the valve closets can be enamelled and provided with special cleansing jets, and closets having these improvements are now manufactured, but the overflow-passage cannot be so scoured, and I know of no closet in which the attempt to do so has been made. Finely divided waste dissolved in the water and making its way into the overflow-passage, as it very frequently does and must, soon fouls it, and once the foul deposit has begun it can never be arrested, except by taking the closet to pieces. The extent of surface which *cannot* be reached by special scouring streams is, therefore, greater in the valve than in the best pan closet, and this goes far to offset the advantage it has in the smallness of its receiver.

(*b*) The flushing stream does not act instantaneously, but only after the supply-pipe has had time to fill from the cistern. In this defect, which may be remedied in the manner hereafter to be described, the valve-closet is similar to the pan-closet.

(*c*) The valve, like the pan, breaks the force of the flushing stream, and prevents its passing through the receiver and trap in a compact volume, occasioning (*d*) a total loss of the power which the water-head could give. Here again the valve and pan closets are equally defective.

(*e*) The same causes for the production of disagreeable noises in flushing exist in both kinds of closets. Most valve-closets now in the market being protected by patents, their workmanship like their price is superior, and some of the causes of noise are partially overcome; but the same care devoted to the construction of the pan-closet would effect the same result, and, so far as *principles* of construction are concerned, the valve-closet has, in this particular, no superiority over the pan-closet.

(*f*) To operate the machinery of a valve-closet requires even more strength than is the case with the pan. It is indispensable that the valve press very firmly against its seat in order to retain and sustain the large body of water in the bowl above it, while no such pressure is required with the pan, whose holding capacity is dependent upon its form and not upon the principle of closeness of contact. To overcome this greater pressure a greater effort is required, so that in this respect the valve-closet stands inferior to the pan.

(*g*) In the matter of complication of arrangement for the simultaneous opening of the closet and cistern valves through levers, cranks, and wires, the valve and pan closets are evidently equally defective.

(*h*) When the water-closet is used as a slop-hopper, and a large body of water is suddenly emptied into the bowl, the obstruction occasioned by the valve to the outflow of the water is likely to cause spattering, while the pan, on the contrary, though it forms an obstruction, allows the water to escape in a measure as it is poured in; and the danger of spattering and overflowing is somewhat diminished.

When, as often happens, the valve is suddenly closed at the moment the waste matters are passing out, and catches these matters, it presses them against the valve-seat, whence they can never be removed by flushing, but remain to decompose until they are scraped off with great difficulty by hand. The same objection holds with the pan-closet, but such an obstruction on the valve causes it to leak, and as soon as the water has escaped from the bowl the odor of the adhering matters becomes intolerable.

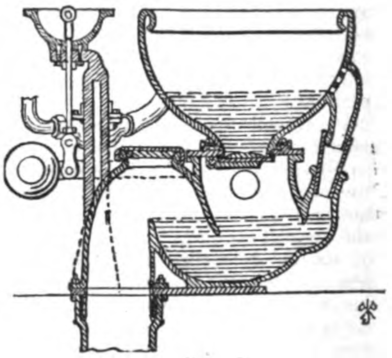

Fig. 3. — Valve-Closet.

The Form of the valve-closet is: —

(*a*) Complicated by the overflow, not required in the pan-closet. In other respects the machinery of the closets is similar.

(*b*) The receiver is smaller in the valve than in the pan closet, and herein lies its only important point of advantage over the latter. It has less surface to become foul, and it enables the trap to be placed above the floor.

(*c*) The form of the bowl and principle of the valve admits of a larger surface of water for the reception of the wastes than is possible with the pan-closet. This has its advantages and its disadvantages. Under the former head belong the greater cleanliness it gives, and the stronger flush for the drains. Under the latter, its increased consumption of water and its liability to siphon out the water in the water-closet trap and in the overflow trap.

(*f*) As in the pan-closet, the trap and receiver are invisible and inaccessible from the outside and are in these respects equally defective.

The Material. — As in the pan-closet the materials of construction are usually not the best for their purposes.

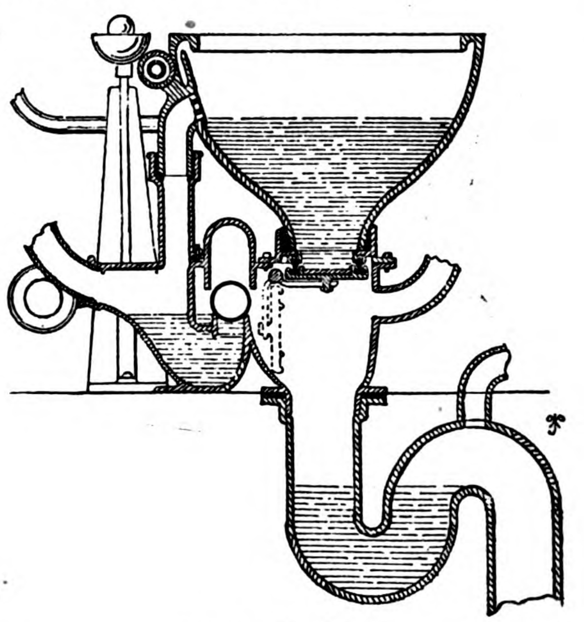

Fig. 4. — Valve-Closet.

The Construction. — (*a*) The valve, like the pan, the receiver, and all the machinery connected with them are *unnecessary*, because the wastes can be better removed and all the functions of a perfect closet be better performed without them, and they form no additional security against the entrance of sewer-gas. The money thrown away upon them should be saved for improving, strengthening and protecting the useful and necessary parts. This is the vital defect in the principle of the valve-closet and is the same as in the pan-closet.

(*b*) As is the case with the pan-closet, there is nothing in the mechanism of the valve-closet to provide against the loss of its water-seal through evaporation, momentum, siphonage, or suction, though such a provision is possible in a good water-closet, as will hereafter be shown.

(*c*) As is the case with the pan-closet, there is an unnecessary number of joints and parts. The overflow adds others not required in

the pan-closet. To prevent the loss of the overflow water-seal by the siphonic action of the flushing, already referred to, it is necessaryt o ventilate the receiver. To carry off the odors generated in the receiver of the valve and pan closets, a single vent-pipe is not sufficient. Efficient ventilation implies an air-supply as well as an air-exhaust pipe, which adds enormously to the expense. Were there no receiver these two pipes would be dispensed with.

(*d*) In practice, the connection between the bowl and receiver is usually better made than in the pan-closet, but in principle they are the same.

(*e*) Equally defective is the valve-closet in the want of a frame around the bowl to protect it, and receive the weight of the wood-work.

(*f*) Equally defective is its connection with the soil-pipe.

(*g*) The valve is more complicated in form and construction than the pan. It requires a very carefully-turned seat, and a rubber packing. This lasts at best but a short time, dependent upon the quality and durability of the perishable material of which it is made. Hence, repairs are necessary quite often, and much oftener than with an equally well-made pan-closet.

The Cost of manufacture is evidently considerably greater than that of the pan-closet on account of the overflow, and of the principle of the valve, which requires both greater strength and delicacy of form and adjustment. It is correspondingly more liable to get out of order, and hence is more expensive to keep in repair.

DEDUCTIONS.

Thus we find in the valve-closet every defect of the pan-closet, and at the same time others which are peculiar to itself.

Of all the defects of both, the greatest is evidently the dependence upon a construction which involves the use of a receiver or inaccessible cesspool, which is never clean, never tight, and is opened wide to discharge its odors into the house every time the closet is used. If the receivers were of the same size, or could be kept equally free of foul deposit, it is evident that the valve-closet would stand very far below the pan; but this is not the case. The ordinary pan is twice the diameter of the ordinary valve, and has four times its superficial area. To give room for a quarter revolution around a point on its circumference requires a space eight times as large, and the wall surrounding this space must have an inner surface four times as extended. A flushing stream large and powerful enough to thoroughly scour the smaller receiver (except the parts behind the valve) would have no effect whatever upon the surface of the larger, unless divided up into small jets and directed advantageously against all parts of it, and even then the scouring effect would be only one-quarter as great as in the smaller receiver, and in both cases the amount of water required would be very great.

Now, with the common pan-closet the special sprinkler for the receiver is not used because the first cost and the consumption of water is too great. With the cheaper pan-closets the receiver is not even enamelled. Hence, the foul deposit accumulates very rapidly on the sides, and the "hidden chamber of horrors" exhales its noisome odors into the house. The closet becomes a perpetual open cesspool, and defeats its own object. Anything is better than this, and a well-constructed valve-closet with enamelled receiver is, in spite of its many faults, a much less objectionable apparatus.

Where, however, the pan-closet receiver is enamelled, ventilated and provided with a powerful sprinkler, and where all parts of the closet are strongly and carefully made and put together, so that, in short, its cost is as great as that of the valve-closet, the greater size of its receiver does not become so serious a matter as the complicated construction of the valve, and the general unreliability of the valve-closet. Hence the best modern patent pan-closets are to be classed as superior to the valve-closet, and, in general, the former stand higher than the latter in principle of construction. The three points in which the valve-closet gains in comparison with the best modern pan-closets, namely: —

(1) In having a smaller receiver;

(2) In holding a larger body of water in the bowl;

(3) In enabling the trap to be placed above the floor, are more than offset by the six points in which it loses, namely: —

(1) In requiring an overflow-passage;

(2) In requiring greater accuracy and strength in the working parts;

(3) In its liability to lose the water in the bowl through an obstruction under the valve;

(4) In requiring the use of a perishable material in the valve washer;

(5) In requiring more strength to operate it;

(6) In its greater tendency to siphon out the water in its own trap and in its overflow trap.

Ninety-nine out of a hundred of the pan-closets set to-day are without the modern improvements referred to.

These have received the unqualified condemnation of sanitarians, and no plumber can be excused for recommending them.

The valve-closet, however, has not yet called forth such general expressions of disapproval from the authorities, partly, perhaps, because their views have not changed as they should to correspond with the changed conditions the last few years have developed in plumbing; partly because the construction of the valve-closet is so far superior to that of the ordinary pan-closet as to bias the judgment in confusing matters of workmanship with matters of principle; partly because nearly all the valve-closets are protected by patents, which may have prevented some critics from fully expressing their convictions through deference to their owners; and partly, perhaps, because many, knowing of no water-closet to which they could give their unqualified approval as an alternative, have not laid sufficient stress upon the defects of the valve-closet. So long as sanitarians and the public are divided in their opinion as to this closet, the plumber can hardly be blamed for taking a neutral ground in regard to it, and the public will continue to incur the annoyances arising from its use, until they are relieved by a more general enlightenment on the subject.

THE ILLUSTRATIONS.

UNITED STATES COURT-HOUSE, PEORIA, ILL. MR. J. G. HILL, SUPERVISING ARCHITECT OF THE TREASURY DEPARTMENT.

SKETCHES IN SEVILLE, SPAIN. MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

See article on "Spanish Architecture" elsewhere in this issue.

DESIGN FOR A COUNTRY-HOUSE. MR. W. A. BATES, ARCHITECT, NEW YORK, N. Y.

COMPETITIVE DESIGN FOR A MECHANICS' DOUBLE-COTTAGE, SUBMITTED BY "*Family Broils.*"

For a description see elsewhere in this issue.

LECTURES ON ARCHITECTURE.[1] — III.

THE architecture of our own country previous to the Revolution was influenced by the prevalent taste in the mother country, and exhibits some examples of Italian architecture, which with very few exceptions far surpass any of our more modern productions in the art. We have several examples which do honor to the talent of their architects, and to the liberal taste of those who employed them. It is, indeed, a sad truth, and none the less so, however much outcry may happen to be raised against its enunciation, that if we look about us in Boston for any correct or pleasing building, we do not find it so much in the works of our own time as in those which were executed sixty or eighty years ago. One of these, the old King's Chapel, on Tremont Street, has often been the subject of judicious admiration. If the exterior be bare of ornament, at any rate it makes no pretension to any other character; it is a plain, solid, well-jointed piece of masonry, which is respectable for its sober unity of expression, and venerable, at least in our young country, from the weather-stains which have gathered upon it for nearly a hundred years. In its exterior form and character it is almost exactly like the London churches erected at the same period; such a one as Hawksmoor, Gibbs, or Kent, the English architects of that day, would have been very likely to design. Its plan is that of a simple oblong building, with a semi-elliptical recess for the chancel at the eastern end, and having a heavy square at the opposite front. The tower is surrounded on three sides by a plain portico, which might have been omitted without disadvantage to the design. The order displayed in it is the Roman Ionic, and the details are executed in a correct and pleasing manner. Not so, however, in the recent alterations and repairs, where, by the omission of much of the old work, and the substitution of meagre, shallow, Grecian mouldings in what has been restored, the vile taste of the present race of builders is continually obtruded upon the eye. The windows of this church in the lower row are small and nearly square, covered with a low flat arch, and deeply recessed in the wall. In the next, or gallery story, they are still of the same width, but nearly twice as high, and finished at the top with semicircular arches, the substantial solidity of which would be aped in vain by the bricks and cements and stucco compositions of our gaudy contemporaries. A bold, projecting cornice crowns the whole, relieved with modillions on its lower surface, but appearing perfectly in keeping with the main idea. To the race of "Roman cement men," as Mr. Pugin happily calls them, I can imagine that this exterior would present very little attraction. There is indeed, nothing particularly handsome in it; but it is the *sentiment* shown by its designer, which is deserving of admiration; an utter absence of clap-trap and pretension; a stern disclaimer of wishing to appear anything more than it really is; a plain rejection of extraneous and ostentatious fictions. No one of true taste could look at it in this light for a moment, and then wish to see it stuck over with dapper shreds and patches of

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[1] Extracts from a lecture by the late Mr. Arthur Gilman, delivered before the Lowell Institute, Boston, in the winter of 1844-45. Continued from page 114, No. 402.

Grecian ornament. It is perfectly consistent with itself, and tells its own story unweakened by any after-thought, and undisfigured by any deformities.

But though the exterior of King's Chapel is so designedly unpretending, the architect has bestowed a much higher, yet equally consistent degree of finish upon the interior. The nave, or body of the church is separated from the aisles by very elegant Corinthian columns, standing in couples, and raised upon appropriate bases; just as they stand in the exquisite façade of the Louvre, and in many of the most characteristic examples of the Venetian school. Perhaps the manner in which the entablature of these columns is broken to receive the arches of the ceiling is open to criticism; but it should be recollected that architecture, when rightly considered, means much more than a childish measuring of this moulding and that moulding, at the expense of a failure to appreciate the principles of fitness, and expression in their most obvious manifestations. The whole effect of this interior is so solemn and imposing, and so fully answers what is required in our ideas of a church, that we ought willingly to forget this slight license. The King's Chapel was not composed by an architect of the mechanical copying school; he had a proposed effect, present and visible to his mind, before he drew a line on the paper; and he has produced it full and complete in his building. There is no other church in Boston where the "dim, religious light" so conducive to a devotional frame of mind is admitted with such judicious and sparing economy; the decent pulpit desk and clerk's desk, standing apart from the chancel; the antique altar-piece with the Prayer, the Belief, and the "good commandments ten;" the marble monuments to occupy the centre of the wide piers, and the deep, quiet organ-loft at the western end at once bespeak the character of a church, and make us sensible that we caanot desecrate it even in thought. It has the air neither of a disguised ball-room, nor a travestied theatre; it neither resembles the church in Chauncey Place, nor the Tremont Temple, its unfortunate neighbor. . . .

In 1762 appeared the first volume of Stuart's "Antiquities of Athens," a work upon which it is scarcely too much to say that praise might be exhausted, without surpassing a just appreciation of its merits. A second visit to Greece by Nicholas Revett, the coadjutor of Stuart, at the cost of the Society of Dilettanti, produced the "Ionian Antiquities" in the year 1769. The glories of ancient Greece are depicted in these admirable works with a clearness and fidelity only to be equalled by Mr. Pugin's subsequent elucidation of Gothic architecture. What an opportunity was now presented for the taste of the profession to be elevated and purified by the study of these monuments of the best days of classical antiquity. But a different method was pursued; the books fell into the hands of the cement-and-copying school, and wherever we look about us we see the result. . . .

The school of Athenian copyists now began to rise into favor; and the art in consequence declined. I do not know of a single structure out of the hundreds produced by this class of artists which is deserving of mention as an example of taste; and it is some consolation to find them entirely omitted by Mr. Gwilt in his "Encyclopædia," and denounced by Mr. Leeds, the accomplished editor of that accurate and beautiful work "The Public Edifices of London;" but perhaps the name of James Wyatt claims a station in this consideration of architecture in England, for the part he took in the revival of Gothic architecture, which, before the close of the eighteenth century, had begun to dispute for ascendency in the conflict of styles, over the fallen Palladian. Wyatt took up the Gothic style with a view to reproduce it; he speedily acquired a considerable knowledge of its forms and details, and showed that these were to be gained like those of any other style, by the study and measurement of original examples; by research and comparison; and by no other means. But its spirit he had not yet acquired, nor did he ever understand the broad principles even of those various modifications of the style as applied to civil, military, and ecclesiastic purposes, however well he may have been acquainted with its general features. This was, indeed, too much to expect from the labors of a single individual; but Wyatt seems to have felt no distrust of his own knowledge, and it is certain that his employers had none, from the unexampled and barbarous manner in which he was allowed to mutilate the exquisite cathedral of Salisbury, under pretence of repairs. The rash architect, in spite of remonstrances, was allowed to demolish at his own pleasure, and to proceed according to his own notions of architectural effect. To correspond with what he called the innate beauty of unity, he swept out the inside of that venerable pile, reducing the whole edifice as far as possible to an empty room; thereby stultifying the architects of the middle ages, who showed their skill in no point more strikingly than in the gradual and distinct development of those numerous members which constitute the complicated fabric of a Gothic cathedral. There perished by this act of vandalism, eleven chapels, the two porches, the bell-tower, and the illuminations on the roof and walls. Thus what the Reformers and the Puritans had spared, this restorer seemed likely to destroy; but happily, the general feeling on the subject was so strong as to prevent, it is to be hoped forever, similar acts of devastation elsewhere.

As the church in Cambridge, Mass., was erected in the year 1760, it belongs strictly to the period which has now been reviewed. Probably no building of its size made its appearance in the mother country during the same time, which exceeds it in the extreme beauty of its design. It is — or rather it was, for the interior went through the ordeal of *church wardenizing* not long ago — a model of beauty and propriety in all its parts; its design belongs purely to the Venetian school, and presents us with some of its most admired characteristics. No one can fail to observe the happy effect of its exterior proportions, and the dignity it acquires from the deep cornice of the Italian Doric with which it is finished. On each side of the church are five long circular-headed windows, crowned with a bold moulding, which ends in a return, and imparts a great degree of relief to the apertures which it decorates. The tower is singularly modest and charming, with not one-half the show, but infinitely more than the merit of its neighbor, which stands on the opposite side of the churchyard, and which has well been termed "a hideous bandbox cathedral." The effect of the interior, though somewhat injured by alterations, is yet very pleasing. There is no doubt that the architect intended to have made the entablature which is over the columns that separate the nave and aisles continuous, instead of carrying it up in a square mass over every single column; but a want of the necessary funds at the time is said to have prevented its completion. The organ gallery and the three doors under it are designed in fine taste, the order employed throughout the whole interior being the bold, graceful Roman Ionic, with its angular volutes and delicately finished modillions. The aspect of the church is now much impaired by the situation of what should be the altar-piece, which was brought from the old Trinity Church in Boston, when that building was taken down, and was stuck up in its present situation at the wrong end of the church, so as to block up the front window inside, as well as the corresponding window on the other side. The arrangement of the pulpit, desk, and pews was formerly much more in keeping than at present; the pulpit standing forward into the nave, as at the King's Chapel, but it is now very improperly moved back, so as only to be reached by an inconvenient circuit inside the altar-railing.

It is a pity that any circumstances should intervene to impair the pleasing expression which the architecture of this beautiful little church is calculated to convey; but pleasing as it is, it is quite evident that the example set forth in its design has been almost without any effect upon the public taste. It appears to have been imitated only in a single instance — a church in the same town which stands a little to the left as we enter by the high-road from Boston. But the alterations made in the copy cannot be viewed as improvements upon the original. The elegant simplicity of the one becomes only baldness in the other, which, however, is certainly a much handsomer edifice than many which might be mentioned in its vicinity. It is strange, perhaps, that the purity and harmony of character observable in the older church should generally have been so feebly appreciated, and in this case so poorly copied; but we must account for it on the broad and general principle that the nineteenth century, whenever it condescends to take a lesson from real merit, will not rest satisfied until the example has been *improved* out of all its real beauties. . . .

We have arrived, I think, at a tolerably clear and connected idea of the groundwork of Grecian architecture. A cell, surrounded by a colonnade, is the form which can be traced in almost every temple in ancient Greece, the memory or the remains of which have reached the present day. It does not appear that they ever entertained a thought on any other department of architecture than that which respected the projection of their favorite arrangements; but it may still be inferred that if the prosperity of Greece had continued for a sufficient length of time to have enabled them to discover the deficiencies in an art which they had begun to cultivate in only *one* of its branches, they would have pushed their researches and carried their inventions to a much greater extent. If the private wealth of individuals among them had so much augmented as to introduce a taste for domestic pomp, or if the nature of their climate and other circumstances had concurred to make public buildings of great extent necessary for the accommodation of the people, in which men could be protected from the inclemencies of the weather without being deprived of light, it cannot be doubted that the lively and inventive genius of the Greeks would have supplied those deficiencies under which their system of architecture, as applied to *our* wants and uses, most evidently labors; but we cannot expect to find convenience for our purposes in buildings whose originals were only designed for external grandeur and elegance, while internal decoration of every sort was comparatively disregarded. The area contained within the walls of these temples was so small as not to admit of any ornaments or accommodations on an extended scale, and they were in general buried in such deep obscurity as not to allow of their being used with any comfort for purposes of congregation. Under these circumstances, their architecture, as applied to ourselves, must, of necessity, be found to be extremely imperfect. It is defective in almost all those particulars which will always be deemed indispensably necessary for the accommodation and convenience of a wealthy and luxurious people — those, especially, who inhabit high latitudes, and who, by being under the necessity of living much within doors must find internal convenience and elegance, in public buildings as well as private houses, of more necessity to them than those external accommodations which were so much and so justly admired among the Greeks. Circumstances certainly alter cases, and where the former, as in the present instance, are diametrically opposed to each other it is impossible that the latter should not be widely different.

It must then, I think, become evident that the introduction of Grecian architecture among us to the extent to which it has hitherto been carried has been a great and almost inconceivable mistake. We

have seen that its edifices are suited to another climate, that they are the legitimate offspring of a remote age, an antagonistic religion, an obsolete form of government, and a widely different state of society from our own. Though perfect in their own way, yet with us they have no concern. We might as well expect the cold, stately, statue-like tragedies of the Grecian drama to supplant, on our modern stage, the glowing pictures of Shakespeare and Otway. Beautiful as may be the forms which this pure style of architecture assumed when used by its original authors, chaste and elegant as are the columns that lie scattered in the ruins on the Acropolis, majestic as appears the frowning temple of Jupiter, or the elegant Parthenon, the shrine of the guardian goddess of Athens, standing in their sublime solitude on the hills of ancient Attica, we must still conclude that the forms and uses to which it was then applied are far too few to satisfy the numerous and complex demands of modern art. The Grecian style has indeed been studied with devoted diligence, and defended by its advocates with an almost Quixotic zeal. It has been declared to possess every excellence, and to combine every beauty. If we were a people at all resembling the Greeks in our habits, manners and customs perhaps this eulogy might, to a great extent, be perfectly true; but we are, on the contrary, quite as different as could well be conceived, and therefore a style of building exactly suited to them must be unfitted for our purposes in almost every particular. Whatever may be thought or said of it in the abstract it has, so far, failed to produce among us a single edifice that does not contradict and stultify itself repeatedly upon the most cursory reference even, to the principles of its ancient prototypes. It must certainly be admitted to be deficient in variety. Originally exhibited only under one form, it is unfair to expect that it can be pressed arbitrarily into the service of all. It cannot be moulded to every purpose, nor can we engraft upon it with impunity whatever features our own occasions may happen to call for, whether they are provided for or not in the limited theory of their originals. It is, therefore, an impossible task, in reducing the system of the Greeks to modern practice to avoid even the most offensive and glaring inconsistencies; to do so will yet require a degree of inventive genius that can harmonize contradictions and reconcile impossibilities, that can go beyond the exact calculations of the ancients in accomplishing a certain proposed effect, and recast every part with reference to a new and different whole. It will be recollected, from what was said of the unity of system in Grecian architecture, in the first lecture of this course, that the rigid severity of the style does not submit to any serious alterations. If, therefore, we adopt a perfect Greek temple for any modern purpose our interior will be confined and ill-suited for its intended use, while on the other hand, if we strip the Greek temple of its external colonnade we take away the life and soul of the whole; we entirely destroy the leading and most beautiful feature of the architecture, and our building becomes only a miserable departure from the style it proposes to imitate. The folly of copying only the Parthenon as the one universal model for every public building which we may have occasion to erect is becoming every day more glaring, and it were to be wished that the perception of the error gave, in this case, any reasonable hope of its being amended; but for the last twenty years our architects no less than the public, their patrons, have been joined to their Athenian idols with a blind enthusiasm, and, in consequence, there is more Grecian architecture (such as it is) in New England than was ever dreamed of in Attica.

Let us trust, however, that the *Americano-Greek* lath-and-plaster temple will shortly cease to exist. No style which is so absurdly applied can long outlive the novelty of its first introduction. "If after so long a trial of it," says the eminent critic, Mr. Leeds, "it will be found utterly incapable of giving us anything much better or more consistent than has hitherto been produced, and that we have already exhausted its powers of design and the combinations it admits of, we have no very great reason to be surprised if it should now be laid aside for a style which not only readily adapts itself to our mode of building, but derives much of its character and effect from features for which ancient architecture makes no provision, or, rather, obstinately rejects." These views are certainly founded upon sound reasons, and commend themselves to the unbiased judgment of every cultivated mind. . . .

It is impossible that the Egyptian style should ever be revived at the present day with any great degree of propriety or pleasing effect. The only example of it of any consequence in this vicinity is in the gateway at Mount Auburn, and several tombs in the grounds over which the gateway appears to have diffused its own peculiar character.

If the whole history of architecture had been ransacked to find an inappropriate style for such a structure, the designer might certainly have gone farther, even to the end of the chapter, without faring worse, or without making a greater and more glaring mistake. I have endeavored to show that this style bears the impress of its origin upon the face of it, and that it embodies those peculiar characteristics which would be expected to result from the causes which called it into being. The religion of which it is the offspring has been declared, on high authority, to be the most degraded and revolting form of paganism that ever existed. Egyptian architecture is the architecture of a creed that worshipped embalmed cats, sacred cows, and deified crocodiles; solid and stupendous, it must be allowed, but indelibly associated in our minds with all that is absurd and disgusting in heathen superstition. Its distinct emblems, as well as others so much in vogue at present, have certainly no possible connection with the ideas of Christianity. In Mount Auburn we are presented with winged globes; urns, which commemorate the custom of burning, not burying the dead; inverted torches, signifying life extinguished forever in the darkness and ignorance of heathen despair; and snakes biting their own tails, with an ingenuity of self-destruction that may mean whatever you please to attach to it. The accomplished author of Alciphron speaks of such symbolical sculptures as these, as

"Fit emblems of the faith that sees
In dogs, cats, apes—divinities,"

and it must be confessed difficult to behold the idolatrous Egyptian gateway at Mount Auburn, used as an entrance to a place of Christian sepulture, without thinking it more fit for an entrance to the chamber of the royal beetles, or the consecrated stable of the holy cow of Isis.

The Puritans, the founders of our commonwealth, in their anxiety to escape from every recollection of what they had left behind them in the old world, rejected all forms and varieties of symbolical expression, refusing in any way to recognize the outward form as suggestive of the inward meaning. The cross, for ages almost the only badge of the Christian faith, was avoided with a studious repugnance. The kneeling forms of cherubs and angels, the monumental effigies of the faithful dead, composed into the stately rest of the grave, with the hands crossed upon the breast in an attitude of devout resignation; the dove and the palm tree of early Christianity were alike rejected and forgotten; but so long as man retains his double nature it will be in vain to attempt such a divorce between the outward and the inward existence. Feeling the want, the absolute necessity of some symbolism or other, the descendants of the stern Puritans are reviving it in daily practice; but what is the kind which they have adopted? Not the Christian symbolism of the Middle Ages, which grew with the growth of Christianity and which contains the natural outward sign of its doctrines, but the symbolism of a revived paganism; objects which if intended as *ornaments* are truly hideous, anterior to any of the graces of civilization, and possessing in themselves no beauty of form or outline, and if intended as emblems, are emblems of nothing but heathenish blindness, ignorance, and despair. "A public monument is a book opened for the perusal of the multitude, and unless it declares its own meaning fully, plainly, and sensibly on the face of it, the main use is lost, and it becomes worse than nothing. As long as it continues to be a part of our common stock of visible objects, it perverts the taste of the artist, and bewilders the imagination of the crowd. But the pedantry of imitation unfortunately retains an inveterate hold in architecture; and the more irrational and grotesque the original, the more numerous will be the crowd of its hereditary deformities."

"Certainly there is no place," observes Mr. Cleaveland, whose admirable essay on American architecture would stamp him as a writer of vigorous judgment and elegant taste, even if other proofs of this were wanting, "certainly there is no place, not even the church itself, where it is more desirable that our religion should be present to the mind, than in the cemetery; it is a place which must be regarded, either as the end of all things — the last, melancholy, hopeless resort of perishing humanity; the sad and fearful portion of man, which is to involve body and soul alike in endless night; or, on the other hand, as the gateway to a glorious immortality, — the passage to a brighter world, whose splendors beam even upon the dark chambers of the tomb. It is from the very brink of the grave, where rest in eternal sleep those whom we have best loved, that Christianity speaks to us in its most triumphant, soul-exalting words, of victory over death and of a life which is to come. Surely, then, all that man places over the tomb should in a measure speak the same language."

"Far be it from us," he continues, "to encourage extravagance in these structures, yet it seems to us that if a few dollars more will purchase the change from the architecture of paganism to that of Christianity they would be well expended. As yet, the gateway at Mount Auburn must be considered as unfinished, the present structure being only a model in wood of what is hereafter to be perpetuated in granite. We would, therefore, suggest the question for the consideration of those who are interested in the matter, whether the plan might not be changed, and a Gothic structure erected instead of the one we now have, at little or no additional expense. A fine effect would be produced by a wall pierced by three pointed arches, the middle one very lofty and broad for the admission of carriages. Such a structure, we think, might be erected at no greater expense than the present one, and would serve as the model for a more suitable style of monuments than that which prevails in the cemetery."

These observations of Mr. Cleaveland's were printed in the *North American Review* in the year 1837. From such a simple, earnest, sensible and truthful appeal it would have been natural to expect a favorable result. In the year 1842, however, the trustees of Mount Auburn deemed it proper to expend $9,550, as I am informed, for an Egyptian gateway, erected in granite on the precise model of the former one, and bearing a winged globe by way of an emblem of something or other on its exterior face. I mention this fact because it is certainly right to give honor to whom honor is due.

Persons who have the common sense to laugh at these absurdities are sometimes denominated by the perpetrators of them as fanatics in the cause of pointed architecture, and as blind bigots, who are insensible to any beauty but that of the Middle Ages; but so far from this it may be questioned whether they are not, in fact, much better acquainted with the principles on which the various styles of pagan antiquity were founded than many of their warmest advocates. Hear the testimony of Mr. Pugin, the great reviver of Gothic architecture in England: "I believe the edifices of classical antiquity," says he, "to be

the *perfect* expressions of imperfect systems; the summit of human skill expended on human inventions, but I claim for *Christian* art a merit and perfection which it was impossible to attain even in the Mosaic dispensation, much less in the errors of polytheism. The former was but a type of the great blessings we enjoy, the latter the very antipodes to truth, and the worship of demons.

"I can readily understand how the pyramid, the obelisk, the temple and the pagoda have arisen, and whence the arrangement of their plan, and the symbols which decorate them have been generated. I am prepared to join in admiration at the skill which piled such gigantic masses on each other, which fashioned so exquisitely each limb and countenance, but I cannot acknowledge them to be appropriate types for the architecture of a Christian country.

"If we worshipped Jupiter, or were votaries of Juggernaut we should raise a temple, or erect a pagoda; if we believed Mahomet we should mount the crescent and raise a mosque; if we burned our dead we ought to place cinerary urns on their tombs, as symbolical of such a custom; if we disbelieved the immortality of the soul we should carve inverted torches, signifying the extinction of that 'vital spark of heavenly flame,' with complete propriety on our monumental architecture. If we attached no sanctity to the repose of the grave, beyond the preservation of the physical frame, it would be highly expressive to place the winged globe, the emblem of Anubis, the deity with the head of a jackal, and the supposed watcher of the mummy, on the entrance to our Christian cemeteries, and if we denied the divine mission of our Lord we should at once reject the symbol of His cross; for all these would be natural consequences, and possess an obvious connection and propriety. But in the name of simple common sense, while we profess the *creed* of Christians let us have an architecture, the arrangement and details of which will remind us of our faith, an architecture which we may claim as our own, and whose symbols have originated in our religion and customs. If symbols have *no* signification and no effect why do we use them? But if we *do* use them why not use those which are significant and appropriate?"

THE COMPETITION FOR A MECHANICS' DOUBLE-COTTAGE. — II.

DESIGN SUBMITTED BY "*Family Broils.*"

EXCAVATION AND MASONRY: — The cellar to be excavated 6' below the grade line. Foundation wall to be of good local stone laid on natural beds neatly pointed. Brick to be good hard-burned brick laid with flush solid joints, rubbed, stained and pointed. Fireplaces of pressed brick. Fill in between studding in second story with soft brick. 8"-brick dwarf walls under all partitions.

Carpenter Work: — Second story balloon-frame, clapboarded and shingled. White-pine for all joinery and finish. Hardware, good mortice-locks, "Hemacite" knobs, roses and escutcheons for interior doors. All outside doors trimmed with Berlin bronze.

Tinning: — Valleys and all flashings of best I. C. tin.

Plumbing: — 20" x 36" iron sink and drain-pipe to cesspool.

Painting: — Three coats inside and out, except the shingles.

Plastering: — Brickwork two coats, lathing three coats.

ESTIMATE OF QUANTITIES AND PRICES RULING AT DENVER, COL.

MASON-WORK.	
60 yds, excavating and grading, @ 25 c.	$ 15.00
65 perches stone, @ $2.26	143.00
Cut stone for sills and chimney	40.00
160 ft. drain-tile, laid, @ 30 c. per ft.	48.00
BRICKWORK.	
5540 brick, @ $8.50 per M., laid	$ 470.90
Setting two mantels	14.00
CARPENTER-WORK.	
18,000 ft. rough lumber, @ $20 per M.	$360.00
3,000 ft. spruce flooring, @ $35 per M.	105.00
5,600 ft. white-pine boards, @ $40 per M.	224.00
1,200 ft. clapboards, @ $30 per M.	36.00
19,500 shingles, @ $5 per M.	97.50
24 window openings, all complete, @ $7.50 per window	180.00
28 doors, openings all complete, @ $9 per door	252.00
Stairs, with rails, $65. Box stairs, $40.00. Cellar stairs, $20	125.00
300 ft. moulding, @ 6 c. per ft.	18.00
435 ft. moulding, @ 4 c. per ft.	17.40
6,000 plain shingles for sides, @ $5 per M.	30.00
Carving	20.00
Nails and hardware	65.00
180 ft. valleys and flashings, @ 3 c. per ft.	7.20
Painting	160.00
2 mantels	55.00
720 yds. plastering, @ 25 c. per yd	180.00
Sink, with all necessary plumbing	15.00
Total	$2,668.00
Labor and extras	400.00
Builders profit, 5 %, on $2,668	133 40
Architect's commission	153.40
Total	$3,354.80

DENVER, COLO., May 8, 1883.

Bid for double-tenement according to drawings marked "*Family Broils,*" for the sum of $3,092.

D. B. FOTHERINGHAM.

RECOVERY OF A RAPHAEL. — In the little country house of Blankenheim, in Rhenish Prussia, an oil painting has, according to the *Deutsche Tageblatt*, been found rolled together behind the wainscot, which turns out to be the Raphael which belonged to the Düsseldorf Gallery about one hundred years ago, and was lost on its way to Munich about the year 1805.

WATER-CLOSETS.[1] — XX.

S*UPPLY-PIPE Connections.* — The common manner a few years ago of joining the supply-pipe to the water-closet was by enlarging the mouth of the lead supply-pipe so it would fit against, or making it small enough to enter, the nozzle of the bowl; when the two were fitted, a piece of putty was put around it, and the whole covered with a piece of cloth held in place by a string. The joint is sometimes covered with a piece of sheet-rubber, the rubber being wrapped with wire instead of cord. Joints of this kind are rarely tight for any length of time, and they cause a great deal of trouble by their leakage. Years ago efforts were made to perfect the joint between the supply-pipe and the bowl; but the plumbers as a class do not appear to have taken advantage of the best methods.

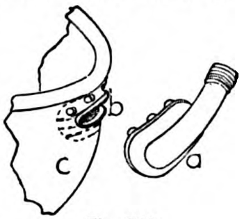

Fig. 208.

Tyler's Joint.

a, Brass nozzle and plate. *b*, Opening into bowl with raised rim. *c*, Bowl.

As early as 1829, Tyler, of London, invented a nozzle which was to be bolted to the side of the bowl by means of a plate made in one piece with the nozzle, and shaped the same as a portion of the surface of the bowl. This plate had ridges, and the bowl corresponding grooves. When the plate was bolted to the bowl, and the space between the two was filled with red lead, or a cement of red and white lead, it made a good joint. The metal nozzle, being made of brass, either had threads to which a pipe could be screwed, or a lead pipe could be connected with it by means of a wiped solder-joint. Before making a solder-joint, the surface of the metal had to be made clean.

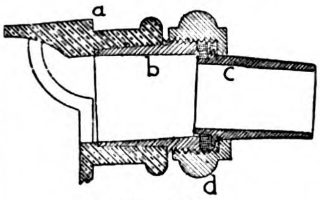

Fig. 209.

Armstrong's Connection.

a, Nozzle of bowl. *b*, First ferule. *c*, Second ferule. *d*, Clamp nut. *e*, Rubber washer.

In 1848, Armstrong invented a mode of connecting the supply-pipe with the closet-bowl. A metal ferule, with screw-threads on the outside edge, is imbedded in the nozzle of the bowl. Working on the thread is a clamp nut. A second brass ferule, with a flange around the larger end, is firmly screwed up against a rubber washer that rests on the first ferule. The lead supply-pipe can be connected by the usual wiped solder-joint to the brass nozzle.

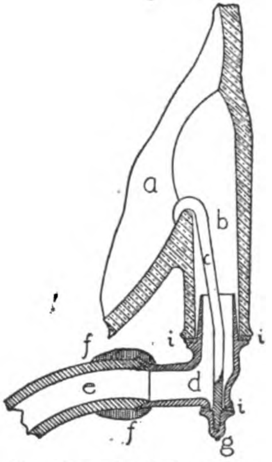

Fig. 210. — Carr's Connection.

a, Bowl. *b*, Earthenware nozzle. *c*, Hook. *d*, Brass connecting-pipe. *e*, Lead pipe. *f*, Solder-joint. *g*, Nut. *i*, Rubber washer.

A novel method of connecting the bowl with the water-supply pipe was invented in this country by W. S. Carr, of New York. A piece of brass tubing is bent or cast so as to form a right-angle, with one end made smaller than the earthenware opening into which it is intended to fit. This metal tube has a flange or shoulder that fits against the outer edge of the earthenware nozzle, there being a rubber washer between the brass flange and the earthenware. Where the brass pipe bends, a hole is left through which a hook passes. This hook is made to fit around the earthenware where the orifice enters the bowl. Where the hook passes through the bend of the pipe there is a nut, by which the pipe can be screwed up tight against the earthenware nozzle. A lead pipe may be joined to this connecting pipe by a wiped solder-joint if it is brass, or it may be connected with iron or brass pipes by a screw-joint.

I find patented in this country a manner of connecting the supply-pipe by putting it directly into the nozzle which projects from the bowl, when a piece of vulcanized-rubber tubing, which fits tightly around the pipe, is stretched over the earthenware nozzle. This manner of connecting the supply-pipe might be employed as a temporary expedient.

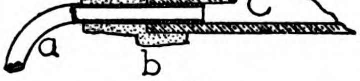

Fig. 211.

a, Lead pipe. *b*, Rubber tubing. *c*, Bowl.

J. L. Mott has patented an ingenious mode of connecting the supply-pipe with the closet-bowl. A small metal plate is used, which is zinc-coated or brass, and has a conical hole in the centre of it. The inlet formed on the bowl has a conical projection of earthenware that corresponds to the hole in the metal plate. A piece of lead pipe is fitted over the conical projection, when the plate is put over the pipe and

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[1] Continued from page 139, No. 404.

screwed fast by means of clamp-screws introduced through slots which are made in the earthenware for the purpose.

Soil-Pipe Connections. — With the most approved forms of water-closets where the trap is above the floor and forms a part of the closet instead of a part of the soil-pipe system, it becomes very important to have the joint between the water-closet and the branch from the soil-pipe made gas-tight; otherwise the trap and vent-pipes would be useless.

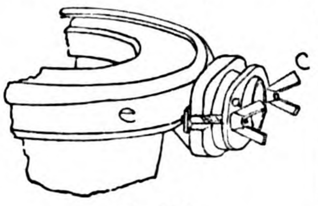

Fig. 212.

Mott's Supply-Pipe Connection.

a, Metal plate. c, Clamp-screws.
e, Bowl.

The common method of bringing the mouth of a trap, or a bell on the branch from the soil-pipe, and beating a part of the sheet-lead safe into it, then putting a little putty or cement on the floor, and screwing the closet down, is very defective. Where the sheet-lead is beaten into the bell it is a very imperfect joint, even when the space is filled with putty. The sheet-lead has no power to resist the packing of even putty into the bell of the pipe. A joint of this kind might be opened, even when gas-tight in the first instance, by jarring on the floor, by any movement of the closet itself, or by the jarring of the soil-pipe.

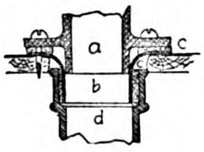

Fig. 213.

Common mode of connecting the Soil-Pipe.

a, Outlet. b, Sheet lead.
c, Putty. d, Soil-pipe.

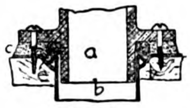

Fig. 214.

Hellyer's Connection.

a, Outgo of closet.
b, Soil-pipe.
c, Cement.
i, India-rubber ring.

Hellyer in his work describes a method of connecting a lead soil-pipe to the "Vortex" closet. A soft india-rubber ring is sent out with these closets, for fixing between the flange of the outgo and the "tafted" (bent over and beaten down) edge of the soil-pipe or lead safe. This india-rubber ring can be made to perfectly seal the jointing, and it will allow for considerable movement in the closet or the floor. The space between the flange of the closet which is screwed to the floor and the "tafted" edge of the soil-pipe or safe can be caulked with spun yarn and a cement composed of red and white lead.

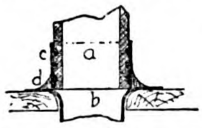

Fig. 215.

Buchan's Connection.

a, Outlet of closet.
b, Soil-pipe branch.
c, Lead around outlet.
d, Solder-joint.

Buchan in his work on plumbing illustrates his method of connecting the "Carmichael" closet to the soil-pipe. A lead branch is brought through a hole left in the floor for the purpose, and beaten out flat upon the floor by a dresser. The outlet of the closet, instead of having a flange, in the usual manner, has three grooves formed in the earthenware. A piece of lead is placed around the bottom of the closet outgo, and being forced into the grooves, and the depressions filled with solder, it would probably form a tight joint. The lead on the outlet of the closet and the tafted edge of the pipe are joined by solder.

What is generally considered the best American practice is a modification of Hellyer's and the common methods. A Y-branch is brought from the soil-pipe to within a limited distance of the floor. Into the hub of the Y-branch a short section of brass pipe is caulked, by putting in a gaskin, then pouring in molten lead and driving it firmly in with a caulking tool. A short section of lead pipe is put in, just long enough to be carried through the hole made for the purpose in the floor, and beaten over so as to form a flange about two inches wide on the top of the floor, and at the same time reaching the brass pipe. When the lead pipe has been properly soiled, and the brass tube filed bright, they can be joined together by a wiped solder-joint. Where the pipe is turned over the floor, it is usually joined to the safe by a solder joint. There is a soft rubber ring stretched around the outgo of the closet just beneath the flange which is screwed to the floor. The space between the flange and the tafted edge of the lead pipe or the safe can be filled by a cement composed of white and red lead. This method of joining the closet to the soil-pipe is recommended by the most prominent sanitarians, but I think it objectionable in having the short lead pipe where it is exposed to the action of gases generated in the soil-pipe. There is every reason to believe that this acts on lead injuriously; in fact, reasons which are urged against lead soil-pipe may with equal force be urged against this short piece of lead; the whole inside sewerage system being only as efficient or as perfect as is its weakest point. I also object to having the closet depend for its stability on the floor, which is constantly undergoing expansion and contraction, according to the moisture and dryness of the air, and is subjected to vibrations from movements that may occur upon it. The above methods are all imperfect in their mode of connection. I think the methods described below are the best that have been introduced.

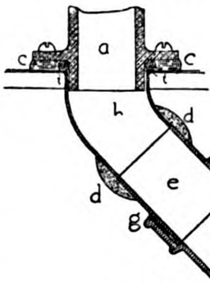

Fig. 216.

Improved Connection.

a, Outlet of closet. b, Lead pipe.
c, Putty. d, Solder joint.
e, Brass pipe. f, Iron pipe.
g, Outlet-joint. i, India-rubber ring.

The Durham Drainage Company, of New York, have connected with the branch from the soil-pipe an iron fitting with a large plate or flange formed on it to receive the closet. When the outgo of the closet has a soft rubber ring put just beneath its flange, and it is screwed down tightly, a permanent gas-tight joint would be formed, the space between the two flanges which was not filled by the rubber ring being filled with cement. In section its appearance would be the same as Figure 213, except an unyielding plate, which forms a part of the soil-pipe, would take the place of the yielding floor, and an iron pipe the place of the lead one. This method may be used where the trap, flange, and outlet are made in porcelain or earthenware.

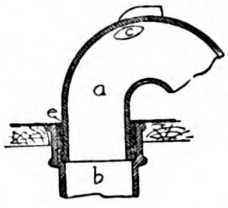

Fig. 217.

a, Trap. b, Branch from soil-pipe. c, Vent.
e, Caulked joint.

The other method, which can only be used where the trap is of iron, has been recently introduced by J. L. Mott in connection with his side-outlet short-hopper closet. A branch from the soil-pipe has its hub brought to a level with the floor. The end of the trap is formed, as it is usual, with the spigot end of the soil-pipe with a small projecting ring around it. The trap is formed so it can run below the floor, the depth of the hub, into which it is caulked in the usual manner. In either of the cases mentioned, the trap of the closet and the closet itself forms a part of the soil-pipe system, the joints being as perfectly formed as any other joints in the system.

Safes. — It is customary and usually necessary to have sheet-lead safes under closets, to catch leakage or splashing that may occur from water or slops thrown into the bowl. These safes are simple shallow pans, formed by the turning of a piece of sheet-lead up about an inch-and-a-quarter high. These pans are placed beneath the closet, and their size varies, according to circumstances, from a safe which covers the whole of the bath-room floor to one that will only cover a space about two feet square. Safes, to be useful in case of an emergency, must have a waste-pipe. A few years ago (and the same manner of connection may be found in a large number of houses at the present day) it was the custom to connect this waste-pipe with the soil-pipe. In some cases there was not even a siphon-trap between the soil-pipe and the room. In the better class of work it was usual to connect the supply-valve with the trap of this waste by a small quarter-inch pipe, called a "weeping" pipe. This weeping-pipe was intended to carry the water that remained in the short section between the valve and the bowl when the water is cut off, into the trap of the safe-waste. It is positively wrong to connect the safe directly with soil-pipe. The weeping-pipe may be stopped without the knowledge of any one, leaving the water in the trap to evaporate. The trap of the waste would be siphoned by each discharge from the closet. The best practice is to carry a "tell-tale" pipe from the safe into the kitchen or cellar, and leaving it open over a sink that is in constant use, where if anything were wrong, it might be noticed and stopped. In England the custom is to carry this waste-pipe through the wall, where it is allowed to form a drip or overflow. In some instances the outlet is closed by a flap-valve, to be opened by the pressure of water, if the hinge has not in the meantime become rusty. North of the Potomac, in this country, our cold winters would prevent a waste-pipe of this kind from being effective, as a small leakage trickling through would be sure to freeze and stop up the waste-pipe.

Where the floors of bath-rooms are made of impervious materials, such as glazed tile or slate laid in cement, they should be made to drain to a convenient point, and have a waste-pipe similar to the lead safe.

A safe is illustrated in connection with Jenning's closet (Vol. IV, No. 142, *American Architect*).

Condition of the Air in Theatres. — Some interesting experiments have recently been made in Germany relative to the temperature and condition of the air in theatres when lighted by electricity and gas respectively. The investigations at the Residenz Theatre at Munich showed that the increase of temperature was ten times as great in the upper gallery when gas was used than when illuminated by electricity. In the former case the temperature rose about 16.5° Fahr., and in the latter only 1.6°. In the lower portion of the house there was naturally a less marked difference. With a full house the temperatures with gas and electricity were 84° and 73° respectively. The temperature was not as high in the third balcony with the electric light as in the first with the gas-lights. The amount of carbonic acid was also determined, and it appears that with an empty house, where all the carbonic acid came from the lamps, there was the same difference as in temperature. At the beginning there were about four parts in ten thousand in the auditorium. With gas-lights this increased to five parts in the pit in about half an hour, to eleven parts in the first balcony and twenty in the third. With electricity it was four parts at the beginning, and in half an hour five in the pit, five in the first balcony and six in the third balcony. With five hundred or six hundred people in the house the maximum amount of carbonic acid was twenty-three parts in ten thousand with gas-lights, and eighteen in ten thousand with electric lights. A number of reasons, however, may be given as tending to produce inaccurate results, and consequently these figures cannot be looked upon as absolutely correct. So far as the temperatures are concerned, the results obtained may undoubtedly be accepted as fairly representing the condition of things when using the two different lights, and point strongly in favor of the use of electric illumination. — *Iron Age.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

285,795. Shutter-Bower. — William Butterfield, Boston, Mass.

285,801. Cistern-Cover. — Thomas Cubbins, Memphis, Tenn.

285,806. Fire-Escape. — Timothy H. Foster, Danbury, Conn.

285,808. Fire-Escape. — David Galivan and John C. Manning, Buffalo, N. Y.

285,811. Transom-Lifter. — Henry J. Hardenbergh, New York, N. Y., and Gustav A. Weinreich, Philadelphia, Pa.

285,829. Water-Closet. — Franz J. Merz, Newark, N. J.

285,832. Fire-Escape. — William L. Murphy, Oxford, O.

285,834. Pneumatic Apparatus for Excavating Foundations. — Michael J. O'Connor, Henderson, Ky.

285,865. Ventilating-Apparatus. — Levi J. Wing, Brooklyn, N. Y.

285,866. Friction-Clutch for Elevators. — Wm. Winkless, Newport, Ky.

285,875. Flushing Water-Closets. — James E. Boyle, Brooklyn, N. Y.

285,894. Flooring-Jack. — Jacob Himelberger, Holt, Mich.

285,907. Protractor.—Patrick Kennelly, Bridgeport, Conn.

285,909. Well-Pump Tubing. — Joseph Marsden, Far Rockaway, N. Y.

285,911. Limekiln. — Patrick McLoon, Glencoe, Mo.

285,919. Sash-Fastener. — John Outhwaite, Oceola, Ohio.

285,924–928. Water-Closet and Similar Receptacles. — John Pickering Putnam, Boston, Mass.

285,953. Compression-Cock. — James S. Barr, Wheeling, W. Va.

285,961. Bell-Pull. — John B. Boyle, Baltimore, Md.

286,009. Hod-Elevator. — Albert T. Hull, New York, N. Y.

286,012. Illuminating Vault-Cover or Grating-Tile, etc. — Thaddeus Hyatt, New York, N. Y.

286,018. Kerfing-Gauge for Saws. — William C. Jones, Philadelphia, Pa.

286,024. Clamp for Hand-power Dumb-Waiters and other Purposes. — Edward Lange, Poughkeepsie, N. Y.

286,064. Safety Appliance for Elevators. — William Pintard, Red Bank, N. J.

286,085. Door-Hanger. — Luke A. Smith, Ludington, Mich.

286,119. Hod-Elevator. — Samuel Dale, Boonesborough, Iowa.

286,124. Tool-Handle. — Crawford M. Fairbanks, Pawtucket, R. I.

286,125. Sash-Holder. — John Felt, Clayton, N. Y.

286,134. Apparatus for Heating the Air in Heat-Flues of Buildings. — Albion P. Howard, Brooklyn, N. Y.

286,136. Self-Closing Hatchway.—David Humphreys, Norfolk, Va.

286,137. Vault-Light Roof and Sidewalk for constructing Basements, etc., to Buildings. — Thaddeus Hyatt, New York, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

Dwellings. — Lawrence Turnbull is to have built 7 three-st'y brick buildings on Lanvale St., commencing cor. Greenmount Ave., each 14′ x 50′; cost, $10,000, from designs by J. A. & W. T. Wilson, architects; Wm. Reed, builder.

Three double houses, brick and stone, each 40′ x 60′, are to be built on Eutaw Place, by George Zimmerman, builder; cost, $15,000 each.

Exhibition Building. — There is a movement on foot, backed by Hon. F. C. Latrobe, Robert Garrett, James A. Gary, and others, for the erection of a permanent exhibition building, on the block bounded by Eutaw, Franklin, Howard and Mulberry Sts. Two plans for the construction of the building have been submitted. The first floor will be occupied by storerooms. It will be built of brick, marble and iron, and cost about $500,000.

Alterations. — The chapel of the Associated Reformed Church, on Columbia Ave., is undergoing alterations, to cost $6,000, from designs by W. H. Marriott, architect; W. S. Smith & Bro., contractors.

The same parties have the contract for remodeling Emmanuel Episcopal Church, from designs by J. Crawford Neilson, architect; cost, $6,000.

Building Permits. — Since our last report nineteen permits have been granted, the more important of which are the following: —

Fritz Frederick, two-st'y brick stable, s s Chew St., between Castle and Chester Sts.

John Sengle, two-st'y brick building, w s Madeira Alley, between Gough and Bank Sts.

Aug. Dagenhart, 2 three-st'y brick buildings, n s Biddle St., e of Valley St.

Savings Bank of Baltimore, three-st'y brick back building to s e cor. Eutaw and King Sts.

C. C. Rumpf, two-st'y brick building, 20′ x 32′, n s Portland St., between Greene and Emory Sts.

Lewis Beverunger, 3 two-st'y brick buildings, n s McElderry St., w of Madeira Alley.

Stephen McGowan, 2 two-st'y brick buildings, s s Ramsey St., between Scott and Sterrett Sts.

Philip Welsh & Sons, three-st'y brick carpenter-shop, s e cor. Maryland Ave. and Federal St.

John Thomas, two-st'y brick stable, in rear of No. 60 w s Division St., between Lanvale and Dolphin Sts.

Brooklyn.

Building Permits. — *Fulton St., No.* 92, three-st'y brick store and warehouse, tin roof; cost, $4,000 or $5,000: owner, Sarah J. Semonite, 147 Lafayette Ave ; architect, G. L. Morse.

Cook St., s s, 250′ e Bushwick Ave., four-st'y brick factory, gravel roof; owner, Iron-Clad Manufacturing Co., Cook St., near Bushwick Ave.; architect, A. Herbert; builder, S. Borrows.

Sumpter St., s s, 100′ e Howard St., 6 three-st'y frame tenements, tin roofs; cost, each, $1,500; owner and builder, Jno. Mulqueen, 67 Myrtle Ave.; architect, R. Given; mason, E. Mullin.

Pleasant Pl., w s, 80′ s Herkimer St. and Rockaway Ave., e s, 80′ s Herkimer St., 10 two-st'y frame dwells., gravel roofs; cost, each, $2,000; owner, G. H. Bishop, Boston, Mass.; architect, G. H. Chamberlain.

Braxton St., s s, about 198′ e Seventh Ave., 11 two-st'y frame dwells.; cost, each, about $2,200; owner, Jane O. Carpenter, 481 Classon Ave.; architect and builder, J. H. Darrow.

Sixth St., e s, 100′ s South Ninth St., three-st'y and basement brownstone front dwell., tin roof; cost, $5,000; owner, E. McLoughlin, South Eleventh St., near Third St.; architect, I. D. Reynolds; builder, D. Concannon.

South Ninth St., s e cor. Sixth St., 3 three-st'y and basement brownstone front dwells., tin roofs; cost, each, $5,000; owners, etc., same as last.

Manhattan Ave., No. 111, n w cor. Fourth St., four-st'y brick stores and double tenements, tin roofs; cost, $6,000: owner and architect, J. J. Randall, 68 Nassau Ave.; builders, Van Riper and Randall & Miller.

Middleton St., s s, 120′ w Harrison Ave., three-st'y frame factory, gravel roof; cost, $10,000; owners, Cooper & McKee, South Fifth St., near Second St.; architect, E. F. Gaylor; builders, Thomas Gibbons and Jenkins & Gillies.

Jefferson St., n s, 80′ e Tompkins Ave., 6 three-st'y brownstone front dwells.; cost, each, $7,500; owner, Wm. Johnston, 96 Taylor St.; architects, Parfitt Bros.; builder, G. B. Stoutenberg.

Ninth St., n s, 150′ e Gowanus Canal, three-st'y brick factory, felt and gravel roofs; cost, $35,000; owner, New York Tartar Co., 106 Wall St., New York City; builders, W. & T. Lamb, Jr., and B. Gallagher.

Conselyea St., s s, 100′ w Humboldt St., 3 three-st'y frame dwells. and tenements, tin roofs; cost, each, $2,700; owner and builder, Jacob Rauth, Jackson St., cor. Humboldt St.; architect, A. Herbert.

Bushwick Ave., w s, 54′ s Wall St., three-st'y frame store and double tenement, tin roof; cost, $4,200; owner, John Mayer, 134 Harrison Ave.; architect, T. Engelhardt.

Adams St., Nos. 94, 96 *and* 98, s s, 97′ 5″ w Evergreen Ave., 3 three-st'y frame tenements; cost, each, $3,500; owner and builder, Geo. Loefler, 78 Jefferson St.; architect, T. Engelhardt.

Calver St., n s, 50′ w Leonard St., 2 three-st'y frame tenements, gravel roofs; cost, $9,600; owner, H. A. G. Henshkel, Greenpoint Ave.; architect, F. Weber; builders, J. Reed and Port & Walker.

Newell St., w s, 120′ w Norman Ave., 2 four-st'y frame double tenements, felt, cement and gravel roofs; cost, each, $5,000; owner and builder, David Atkins, 551 Lorimer St.; architect, E. F. Gaylor; mason, J. T. Gately.

Tompkins Ave., w s, 25′ s Park Ave., 3 three-st'y brick stores and double tenements, tin roof; cost, $6,000; owner, Christian F. Teeves, Jr., 169 Fifth St.; architect, T. Engelhardt; builders, G. Lehrian & Sons and F. J. Berlenbach.

Tompkins Ave., s w cor. Park Ave., three-st'y brick store and double tenement, tin roof; cost, $7,000; owner, Anthony Wetterer, 22 Stagg St.; architect, T. Engelhardt; builders, G. Lehrian & Sons and F. J. Berlenbach.

Broadway, s e cor. Suydam St., three-st'y brick store and flat, tin roof; cost, $8,000; owner and builder, Frederick Herr, 778 Broadway; architect, T. Engelhardt.

Chicago.

Flats. — C. M. Palmer is architect of the six-st'y flat to be built on Michigan Ave., for Leroy Payne; cost, $35,000.

Furst & Rudolph, architects, planned the three-st'y flats to be built on West Congress St., for Henry Furst; cost, $15,000.

W. A. Furber is architect of three-st'y flats with stores on first floor, to be built for Leonard Hodges on Twenty-second St., to cost $11,000.

Houses. — Furst & Rudolph, architects, planned the two-st'y dwell. to be built on Pauline St., for Mary E. Sands; cost, $9,000.

The same architects made plans for Mrs. Ober's two-st'y dwell. on Fulton St.; cost, $10,000.

H. Weissner is architect for three-st'y dwell. and stores on Division St., for Theodore Schultz; cost, $7,000.

James S. Lyons is erecting three-st'y dwell., with store below, on Eighteenth St.; cost, $8,500.

The two-st'y dwell. to be built on Honore St., for John Oliver, was planned by L. G. Quackenboss, architect; cost, $7,000.

W. F. Mysick will build 2 three-st'y dwells. on Groveland Park Ave.; cost, $10,000; Cobb & Frost are the architects.

W. Meyne is architect and builder of four-st'y dwell. and store to be erected on Milwaukee Ave.; cost, $10,000.

J. Baxter will build 2 three-st'y dwells. on West Monroe St., to cost $8,000.

Machine-Shop. — Robert Tarrant is building a four-st'y machine-shop on Illinois St.; cost, $20,000; Theo Karls is the architect.

Building Permits. — John Oliver, two-st'y dwell., 24 and 26 Honore St.; cost, $7,000; architect, L. G. Quackenboss; builder, Geo. Hinchliff.

Frank Lawlor, two-st'y dwell., 422 Taylor St.; cost, $4,000; architect and builder, J. McGinness.

John Regon, three-st'y dwell., 163 Lewis St.; cost, $3,900; architect, Beaumont; builder, Jno. Pedgeaft.

J. Baxter, 2 three-st'y stores and dwells., 200 and 202 West Monroe St.; cost, $8,000.

U. P. Smith, two-st'y carriage-shop, 3148 Cottage Grove Ave.; cost, $4,000.

Fred. B. Kloske, 6 cottages, 26 to 38 Kendall St.; cost, $7,500.

J. Clark, two-st'y store, 2111 Wabash Ave.; cost, $4,500; architect, J. Clark.

E. Gottke, two-st'y store and dwell., 937 Blue Island Ave.; cost, $5,000.

J. R. Cook, three-st'y dwell., 236 Dearborn Ave.; cost, $5,000; architect, F. Baumann; builder, Geo. Lehman.

M. Yourell, two-st'y dwell., 2521 Fifth Ave.; cost, $3,000.

P. Edgeworth, two-st'y and basement dwell., 321 and 323 Polk St.; cost, $8,000.

Mary E. Sands, two-st'y dwell., 292–296 Paulina St.; cost, $9,000; architects, Furst & Rudolph.

Wm. Hafner, two-st'y dwell., 23 Pratt Pl.; cost, $3,000.

Mrs. Ober, two-st'y dwell., 879–881 Fulton St.; cost, $10,000; architects, Furst & Rudolph; builder, C. Wagner.

Theo. Schultz, three-st'y store and dwell., 152 Division St,; cost, $7,000; architect, H. Weissner; builder, C. Wagner.

F. H. Hemisath, three-st'y dwell., 24 Granger St.; cost, $4,000.

Leonard Hodges, three-st'y store and flats, 84 Twenty-second St.; cost, $11,000; architect, W. A. Furber; builder, J. Griffiths.

James S. Lyons, three st'y store and dwell., 151 Eighteenth St.; cost, $8,500.

H. Staals, three-st'y store and dwell., 1143 Milwaukee Ave.; cost, $6,000.

Daniel O. Reegan, store, 3600 Dashiel St.; cost, $2,000.

Fred. Knehl, two-st'y store and dwell., 842 Clybourne Ave.; cost, $6,000; architect, C. H. Goettig; builders, Hagenow & Co.

A. Amonns, two st'y dwell., 143 Hurlburt St.; cost, $3,500; architect, Edward Stende.

J. R. Van Slyke, two-st'y dwell., 335 West Washington St.; cost, $4,000.

A. Larson, two-st'y dwell., 193 Canalport Ave.; cost, $3,000; architect, August Lonla.

M. Harrican, two-st'y dwell., Nineteenth Pl.; cost, $3,500; architect, August Lonla.

Carter Bros., warehouse, 323 and 225 West Sixteenth St.; cost, $4,000; architect, McCormick.

W. F. Mysick, 2 three-st'y dwells., 1 and 3 Groveland Park Ave.; cost, $10,000; architects, Cobb & Frost; builder, J. Griffith.

W. Meyne, four-st'y store and dwell., 942 Milwaukee Ave.; cost, $10,000; architect and builder, W. Meyne.

Robert Tarrant, four-st'y machine-shop, 52 to 56 Illinois St.: cost, $20,000; architect, Theo. Karls.

Henry Furst, three-st'y flats, 448 and 450 Congress St.; cost, $15,000; architects, Furst & Rudolph.

Fred Hess, cottage, 3008 Butler St.; cost, $3,000.

Horn Bros., four-st'y factory, 281 and 283 West Superior St.; cost, $7,000.

Leroy Payne, six-st'y flats, 186 and 187 Michigan Ave.; cost, $35,000; architect, C. M. Palmer.

J. Gillon, two-st'y dwell., 474 West Harrison St.; cost, $4,000.

Cincinnati.

Building Permits. — C. Fenner, two-st'y brick dwell., Baltimore Pike; cost, $3,000.

Samuel James, two-st'y brick dwell., Chapel St., near Park Ave.; cost, $4,200.

Mrs. Horton, two-st'y brick dwell., Ashland St., near McMillan Ave.; cost, $5,000.

H. J. Riley, two-st'y frame dwell., Ellen St., near Kilgour St.; cost, $4,000.

W. P. Hurlbert, two-st'y brick dwell., Western Ave., near Findlay St.; cost, $6,000.

Wm. Leemeyer, three-st'y brick dwell., Poplar St., near Dalton Ave.; cost, $3,500.

Phillip Kopp, three-st'y brick building, Pleasant St., near Liberty St.; cost, $5,600.

John Letzder, two-st'y frame dwell., Calhoun St., near Madison St.; cost, $3,500.

J. H. Empson, 5 three-st'y brick buildings, Barr St., near Mound St.; cost, $10,000.

Fourteen permits for repairs; cost, $12,000.

Total permits to date, 669.

Total cost to date, $2,480,740.

Milwaukee, Wis.

Building Permits. — Nic. Neuschwander, frame dwell. for S. A. Harrison, on Thirtieth St., Fourth Ward; cost, $3,500.

Hanbolt & Freming, brick dwell. for F. Schmidt, on State St., Second Ward; cost, $3,000.

C. F. Ehlers; brick store for Mr. Kletsch, on Third St., Second Ward; cost, $6,000.

M. Wettermann, 2 frame dwells. for John Miller, on Sixteenth St., Ninth Ward; cost, $4,000.

F. Tenischick, frame dwell. for himself, on Wine St., Tenth Ward; cost, $4,000.

C. Bach, brick building for the Cream City Brewing Company, on Thirteenth St., Ninth Ward; cost, $5,000.

New York.

Houses. — For John T. McDonald, 3 four-st'y brownstone dwells., 16′ 8″ x 55′ each, are to be built on the south side of One Hundred and Nineteenth St., 300′ e of Sixth Ave., at a cost of about $30,000, from designs of Mr. Jos. M. Dunn.

For Mr. Charles L. Guilleaume, 6 first-class four-st'y dwells., to cost about $125,000, from designs of Messrs. Thom & Wilson, are to be built on the south side of Seventy-sixth St., 200′ e of Madison Ave.

On the north side of One Hundred and Third St.,

300′ w of Ninth Ave., Mr. Adam Bickelhoupt is to build 7 three-st'y and basement dwells., to cost about $75,000; brownstone fronts.

Mr. Ralph Townsend has drawn plans for a three-st'y and basement dwell., 20′ x 50′, to be built by Mr. Isaac A. Hopper, for his own occupancy, on One Hundred and Sixteenth St., s s, 300′ e of Eighth Ave., which, with a brick stable, will cost about $20,000.

Building Permits. — *Twenty-third St.*, s s, 175′ e Eleventh Ave., six-st'y brick factory, gravel roof; owner, Fowler Manufacturing Co., limited, 7 Washington Pl.; architect, A. B. Jennings.

Sedgwick Ave., No. 675, s Morris's Dock Station, 3 three-st'y frame dwells.: cost, each, $3,000; owners and builders, McKenzie & McPherson, 52 East Forty-first St.; architect, Jas. B. Lord.

One Hundred and Twenty-second St., s s, 100′ e Madison Ave., 4 five-st'y brownstone front flats and 2 three-st'y brownstone front dwells., tin roofs; cost, flats, each, $25,000; dwells., each, $12,000; owner and architect, Alfred Kehoe, 58 East One Hundred and Twenty-first St.

One Hundred and Sixty-first St., s s, 100′ w Concord Ave., three-st'y frame dwell., tin roof; cost, $4,500; owner, Elizabeth J. Gray, 1 Sylvan Pl.; builder, P. Garvin.

Madison Ave., s w cor. Fifth St., (Twenty-fourth Ward), three-st'y frame dwell., tin roof; cost, $6,000; owner, Albert Ayres, 1793 North Third Ave.; architect, W. W. Gardiner.

West Fifteenth St., Nos. 319, 321 *and* 323, rear, two-st'y brick stable and one-st'y brick office; cost for both, $7,500; owner, Gilman B. Seely, 340 West Fortieth St.; architect, John Sexton.

Ave. B, s w cor. Seventh St., five-st'y brick tenement and store, tin roof; cost, $12,000; owner, Estate Bernard J. Harrigan, per Ed. H. Harrigan, Plainfield, N. J.; architect, Wm. Graul.

Ave. B, w s, 28′ s Seventh St., five-st'y brick tenement and store, tin roof; cost, $11,100; owner and architect, same as last.

College Ave., s e cor. One Hundred and Sixty-first St., 2 two-st'y frame dwells., tin roofs; cost, each, $2,500; owner, Edward Deicke, 550 One Hundred and Sixty-first St.

South Fifth Ave., Nos. 124 *and* 126, six-st'y brick warehouse, tin roof; cost, $40,000; owner, Amos R. Eno, 8 Pine St.; architect, Robert Mook; builder, James Rue.

West Sixtieth St., No. 215, five-st'y brick and brownstone front tenement, tin roof; cost, $14,000; owner and builder, Thomas Cowman, 429 West Forty-eighth St.; architect, M. Louis Ungrich.

West Forty-third St., No. 333, five-st'y brick tenement, tin roof; cost, $18,000; owners, L. & K. Ungrich, 160 West Thirty-third St.; architect, M. Louis Ungrich.

West Thirty-fifth St., Nos. 444, 446 *and* 448, 3 five-st'y brick tenements, tin roofs; cost, each, $17,000; owners, John Schmidt, 602 East Seventeenth St., and Martin Haupt, cor. Sixth St. and Ave. A; architect, Jobst Hoffmann.

Sixty-third St., n s, 100′ e Eastern Boulevard, two-st'y brick stable, gravel roof; cost, $6,000; owner, Adam Neidlinger, foot of Sixty-third St.; builders, J. and L. Weber.

East Forty-fourth St., Nos. 220 *and* 222, two-st'y brick stable, gravel roof; cost, $4,000; owner, C. Neuschaffer, 219 East Thirty-first St.; builder, B. Plump.

Seventy-sixth St., s w cor. Lexington Ave.; 6 three-st'y brownstone front dwells. and extensions, tin roofs; cost, each, $18,000; owner, Anthony McQuade, 157 East Eighty-second St.; architects, Thom & Wilson; done by days' work.

East Eighteenth St., No. 134, five-st'y brownstone front flat, tin roof; cost, $12,000; owner, Anthony Dugro, 103 East Sixteenth St.; architect, F. W. Klemt.

East Eighteenth St., No. 136, five-st'y brownstone front flat, tin roof; cost, $20,000; owner and architect, same as last.

Columbia St., s e cor. Hester St., five-st'y brick tenement and store, tin roof; cost, $15,000; owner, Geo. H. Benner, 81 Cedar St.; architect, Adam Munch; builder, John Fitzpatrick.

Tenth Ave., s w cor. One Hundred and Seventy-third St., two-st'y frame and brick dwell., slate roof; cost, $9,000; owner, Adolph Hinze, 761 Eighth Ave.; architect, H. Kreitler.

Alterations. — *West Forty-ninth St., Nos.* 101 *and* 103, altered for stores and dwells., one-st'y and basement brick extension on No. 103 only; cost, $16,000; owner, John G. Wendel, 79 Maiden Lane; architect, J. B. Snook; builder, not selected.

East Broadway, No. 206, change pitch of roof to rear, also one-st'y brick extension, tin roof; cost, $4,000; owner, Meyer Isaacs, President Hebrew Free School Assoc., 811 Lexington Ave.; architect, H. Fernbach.

Third Ave., s w cor. One Hundred and Twenty-eighth St., two-st'y brick extension, tin roof; cost, $4,000; owner, Jacob Ebling, on premises; architect, J. Boekell.

East Forty-first St., No. 51, interior alterations; cost, $3,000; owner, George Bliss, 387 Fifth Ave.; builders, McKenzie & McPherson..

Fifth Ave., No. 23, n e cor Ninth St., interior alterations, etc., for apartment-house; cost, $25,000; owner, Daniel E. Sickles, 31 Fifth Ave.; architect, E. Sniffin.

Prince St., No. 198, new store front and internal alterations; cost, $3,000; owner, Margaret Leibold, 123 Prince St.; architect, A. Crouter.

East Fifty-ninth St., No. 438, raise front building two stories and two-st'y brick extension; cost, $3,000; owner, Albert Zoller, 25 Eastern Boulevard; architects, A. Pfund & Son.

Tenth Ave., w s, 75′ n One Hundred and Fifty-fifth St., raise one-st'y and internal alterations, and three-st'y frame extension; cost, $4,500; owner, John F. Cunningham, One Hundred and Fifty-seventh St., cor. Tenth Ave.; architect, Chas. Baxter.

East Forty-second St., Nos. 410 *to* 416, repair damage by fire; cost, $3,000; lessee, Robert Ellis, 2 Prospect Pl.; builder, Wm. Archer.

Second Ave., s e cor. Fifty-fourth St., raise one st'y; cost, $4,000; owner, Adolph Kerbs, 121 East Fifty-sixth St.; architects, D. & J. Jardine.

Philadelphia.

Building Permits. — *Fifth St.*, n of Huntingdon St., three-st'y store and dwell., 18′ x 50′; F. Gramlich.

Ingersoll St., w of Twenty-fifth St., 14 two-st'y dwells., 14′ x 34′, Phillip E. Coleman, owner.

Fifteenth St., cor. York St., 7 two-st'y dwells., 15′ x 46′; W. H. Lowes, owner.

Adams St., w of Edward St., two-st'y dwell., 16′ x 50′; W. H. Yelland, owner.

Fifth St., n of Huntingdon St., three-st'y store and dwell., 18′ x 50′; F. Gramlich.

Church St., Nos. 103 *to* 111, addition to five stores, 20′ x 32′; J. Errickson, contractor.

Susquehanna Ave., w of Twenty-ninth St., two-st'y dwell., 18′ x 50′; Henry Mercer, contractor.

Hamilton St., s of Jefferson St., 4 two-st'y dwells., 16′ x 28′; Green & Beran, owners.

Jefferson St., near Ridge Ave., 2 three-st'y dwells., 16′ x 30′; W. Eddleman, contractor.

Jefferson St., near Linden St., three-st'y dwell., 18′ x 50′; Richard Bighter, owner.

Shur's Lane, between Cresson and Terrace Sts., three-st'y dwell., 25′ x 65′; F. Davis, owner.

Manayunk Ave., n w cor. Penn St., two-st'y dwell., 21′ x 32′; P. O. Keefe, owner.

Marriott St., above Seventh St., two-st'y church, 60′ x 110′; E. F. Durang, architect.

Forty-second St., cor. Chestnut St., two-st'y stable, 90′ x 310′; Jas. W. Bradin, contractor.

Orthodox St., cor. Cambridge St., two-st'y dwell., 20′ x 34′; W. P. Carman, contractor.

Twenty-first St., s of Ontario St., 4 two-st'y dwells., 15′ x 42′; D. McNeill, owner.

Ridge Ave., Nos. 3288 *and* 3290 (Falls of Schuylkill), 2 three-st'y dwells. and stores, 22′ x 64′ and 20′ x 52′; Chas. Bartler.

Marshall St., s of Cumberland St., 8 three-st'y dwells., 15′ x 46′; P. Heffling, contractor.

Ridge St. (Bridesburg), three-st'y dwell., 24′ x 32′: Amos W. Linn, contractor.

Twenty-second St., near Carpenter St., four-st'y addition to factory, 60′ x 74′; W. J. Vankirk, contractor.

Cayuga St., w of Sixteenth St., 20 two-st'y dwells., 14′ x 42′, and three-st'y dwell., 15′ x 50′; W. F. Shaw, owner.

Market St., No. 1023, four-st'y store, 25′ x 200′; Jacob Myers, contractor,

Lawrence St., n of Cumberland St., 4 two-st'y dwells., 16′ x 39′; Batley & Bowers, owners.

Leithgow St., n of Cumberland St., 5 two-st'y dwells., 13′ x 27′; Batley & Bowers, owners.

Victoria St., s of Bath St., two-st'y dwell., 14′ x 30′; V. Hazzard, owner.

Cambria St., e of C St., two-st'y dwell., 17′ x 40′; Wm. Rawson, owner.

Delaware River Front, opposite Hedley St. (Bridesburg), one-st'y steel works, 40′ x 150′; G. F. Gibson, superintendent.

Wayne St., between Rittenhouse and Harvey Sts., 12 three-st'y dwells., 33′ x 34′; Townsend Bros., contractors.

Tasker St., n w cor. Dean St., two-st'y store and dwell., 12′ x 32′; James Buist, contractor.

Front St., n of Master St., 2 three-st'y dwells., 17′ x 50′; Shegog & Quigley, contractors.

Garfield St., between Main and Wakefield Sts., two-st'y dwell., 17′ x 43′; W. Sleath, owner.

Wood St., between Twenty-second and Keifer Sts., 2 three-st'y dwells., 15′ x 44′; Wendell & Smith.

Pechin St., e of Penn St., 2 two-st'y dwells., 16′ x 28′; W. Rainer.

Third St., n of Huntingdon St., finishing building, 40′ x 102′, and two-st'y engine-house, 17′ x 65′; Theodore Morgenstern, owner.

Eleventh St., s of Somerset St., 2 three-st'y dwells., 16′ x 52′; Jos. Lomax.

Mill St., w of York Road, Branchtown, three-st'y dwell., 22′ x 43′; W. Conard, contractor.

Ashland St., e of Penn St., 2 two-st'y dwells., 16′ x 26′; W. Rainer.

Jefferson St., n of Ridge Ave., 2 three-st'y dwells., 16′ x 30′; S. B. Righter, contractor.

Fifth St., n of Butler St., 2 three-st'y dwells., 18′ x 50′; Chas. L. Lorey, contractor.

Somerset St., cor. Palethorp St., factory, 45′ x 145′; Jno. Davenport, owner.

Fairmount Ave., No. 2312, one-st'y store, 16′ x 65′; R. J. Whiteside & Sons, contractors.

Westminster Ave., No. 4633, two-st'y dwell., 16′ x 50′; D. McGarvey, contractor.

Belgrade St., No. 823, two-st'y dwell., 17′ x 40′; Jno. Bald & Son.

New Market St., n of Noble St., one-st'y storage-shed, 75′ x 140′; Phila. & R. R. R. Co., owners.

Main St., s of Rowan St., three-st'y store and dwell., 15′ x 52′; W. Keas, contractor.

Toledo.

Asylum. — The plans for the lunatic asylum buildings, to be located at this point, are being prepared by Mr. E. O. Fallis, of this city, and Mr. Yost, of Columbus, O. The buildings are to be some forty or forty-five in number, the "cottage system" being adopted. The approximate estimate of cost is $500,000.

Factories. — Three-st'y and basement brick factory, cor. Superior and Orange Sts., for Gendron Iron Wheel Co., 80′ x 100′; cost, about $20,000; E. O. Fallis & Co., architects; J. V. Sanfleet, builder.

Three-st'y and basement brick factory, cor. St. Clair and Orange Sts., 80′ x 105′; cost, about $20,000; owner, H. S. Walbridge; architects, T. H. Walbridge & N. B. Bacon; builders, Miles, Cramer & Horn.

Houses. — Two-st'y and basement brick and stone dwell., cor. Madison and Twelfth Sts.; cost, about $10,000; L. Franc, owner.

Two-st'y brick block of two dwells., Walnut St., for Mrs. I. B. Waite, about 40′ x 60′; cost, $7,000; N. B. Bacon, architect; J. V. Sanfleet, builder.

Two st'y frame dwell., Lincoln St., for C. L. Smith; cost, $2,700; N. B. Bacon, architect; John Kerruish, builder.

Two-st'y frame dwells., Columbia St., for J. H. Bowman; cost, $4,500; N. B. Bacon, architect; John Kerruish, builder.

Two-st'y and basement frame dwell., Ashland Ave.; cost, $4,300; N. B. Bacon, architect; J. B. Hassett, builder.

Two-st'y frame dwell,, Twelfth St., for T. J. Southard; cost, about $4,000; O. W. Vallette, architect.

Memorial Building. — The foundation and corner-stone of the Soldiers' Memorial Building are in place, and work on the superstructure is to proceed during the coming season. The building will be of brick and stone, three stories high, and contain large drill-rooms, artillery room, memorial hall, etc. The building is located on Adams St., cor. Ontario St.; cost, about $50,000; Messrs. Gibbs & Stine, architects.

Stores. — Three-st'y brick business-building, 18′ x 93′, Adams St., for Geo. Tait; cost, $5,000; N. B. Bacon, architect; Dawson & Anderson, builders.

Three-st'y brick business-building, 20′ x 120′, Summit St., for John Showel; cost, about $7,000; N. B. Bacon, architect.

Four-st'y brick and stone business-building, 60′ x 75′, cor. Jefferson and Superior Sts., for Estate of E. Walbridge; cost, about $21,000; N. B. Bacon, architect; E. Malone, builder.

General Notes.

Ashland, Minn. — Six new stores (one brick, home-made), a brick printing-office, a four-st'y furniture factory, a $10,000 school, and about forty fine residences are in process of erection at the present time.

Brick Church, N. J. — Mr. James H. Bartholomew has commenced the erection of a frame dwell. on Glenwood Ave., to cost $10,000, from plans made by S. W. Whittemore, architect.

Bristol, R. I. — The corner-stone of the Burnside Memorial Hall in Bristol was laid on Tuesday, September 25.

Brookings, Minn. — Work on the Territorial Agricultural College here is being pushed energetically. The foundation walls are finished.

Carlisle, Pa. — Chas. L. Carson, architect, Baltimore, is preparing plans for a one-st'y stone scientific building, 57′ x 179′, for Dickinson College, to cost $30,000.

Concord, N. C. — The Yadkin Falls Manufacturing Company have begun a factory-building. It will be 52′ x 100′, two-st'y.

Fremont, O. — The corner-stone of the new Methodist church was laid August 23.

Germantown, Pa. — Thomas W. Wright has been awarded the contract for the erection of the new hall of the Workingmen's Club.

Key West, N. J. — A hotel, with accommodations for two hundred, will be built here this winter, at the junction of the ocean and Shore River.

Manayunk, Pa. — John Harlan is building a store and dwell. at the cor. of Ripka Ave. and Winchester St.

COMPETITIONS.

STATE CAPITOL.

[At Atlanta, Ga.]

October 6, 1883.

The Board of Capitol Commissioners of Georgia invite plans for a state capitol building, to be erected in Atlanta, Ga., under the following conditions: —

1. An elevation of each side of the building, and a plan of each floor—drawn in black ink only, and to a uniform scale of one-eighth of an inch to the foot.
2. A perspective view of the building, which may be in colors.
3. Detailed and accurate specifications of material and workmanship, so arranged that the work may be let to one contractor or to several contractors for the various classes of labor and material.
4. Such other drawings as may be necessary to fully elucidate the plan.
5. A detailed estimate of the cost of the building, which must not exceed the sum of $800,000.00.

For the accepted design under the above conditions, the Commissioners will pay the sum of $3,500.00;

Provided, the architect furnishing it will deliver within a reasonable time after the award is made, complete and satisfactory detail and working drawings.

The Commission reserves the right to reject any and all plans. Those declined will be returned to competitors.

The building is to be erected upon a lot 421 feet square, practically level, surrounded by streets sixty feet wide. Copies of the Act providing for the erection of the Capitol, specifying the accommodations to be provided therein, and any other information desired by parties intending to compete, will be furnished upon application to the Chairman of the Commission.

Plans should be addressed to the Board of Capitol Commissioners, Atlanta, Ga., and must be received **not later than the 19th day of December, 1883.**

HENRY D. McDANIEL,

409 Governor and ex-officio Chairman Commission.

CREMATORY.

[At Wheeling, W. Va.]

Plans and proposals for the erection of a crematory for the purpose of disposing of kitchen garbage and the contents of privy-vaults, will be received by the Committee on Health of the City of Wheeling, W. Va., **until November 15, 1883.** The plan adopted will be paid for. The committee reserves the right to reject any or all bids. 409

COLLEGE BUILDING.

[At Pierre, Dak. T.]

The trustees of the Presbyterian University of Southern Dakota will receive plans for a college building to be erected in Pierre, said building to be of brick with stone trimmings, to cost, when completed, $20,000, and designed to include chapel, recitation, cabinet, library rooms, etc.

The plans must be submitted to the trustees at Pierre on or before October 25, they reserving the

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CONTENTS.

A SPECIAL meeting of the Archæological Institute of America was held in Boston a few days ago, to receive the report of Mr. Joseph T. Clarke, the chief of the Assos Expedition which successfully closed its labors on the field early in the summer. Unfortunately, Mr. Clarke, whose health remained perfect through all the trials of three years' work in Asia, had hardly reached his comfortable home in Boston, when he was prostrated by a severe attack of malarial fever, and at the time of the meeting was unable to leave his bed. In his absence, however, Professor Norton, the President of the Institute, and Professor Ware, of New York, who had himself just visited Assos, gave some account of the work which had been accomplished by the American party of young architects and amateurs. As now laid open, Assos presents the best existing example of an ancient Greek city, and its ruins have given invaluable information as to many points of ancient architecture and modes of life. Being a provincial town of no great importance, besides having been probably robbed by the Persians in revenge for their discomfiture at the hands of the European Greeks, Assos does not seem to have contained many works of art, and most of the sculptures secured by the expedition are from the archaic temple on the Acropolis of the city. A few marble heads of later date were, however, found, together with many terra-cotta figures, and a considerable number of coins not hitherto known. According to the agreement with the Turkish Government, many of the objects were necessarily left in the East, but enough were retained to fill forty or fifty cases, which are now on their way to this country. Among the contents of the boxes are fragments enough of the temple order to permit a complete order to be set up in the Museum of Fine Arts, which will be for the present the custodian of the property, and a complete account of the work of the expedition with careful illustrations, is now in course of preparation by Mr. Clarke, who will soon return to London, to avail himself of the collections of the British Museum in aid of his labors.

THE rather blundering attempt which was made by Congress last year to gain cheap votes by an enormous bounty upon the works of American artists, as distinguished from foreigners, seems likely to react unfavorably upon those who made it. Notwithstanding the manly protest of all respectable American artists living abroad, which gained for them the personal gratitude and approbation of their foreign rivals, the closing of the great American market to artists of other countries has materially reduced the income of many very worthy and talented people, who are quite justified in appealing to their more powerful fellow-citizens for relief from what they consider unjust exactions. Nothing touches a modern government so deeply as the pecuniary loss which its subjects suffer through the acts of foreigners, and the complaints of the French and Italian artists are sure to be heard and answered sooner or later. In France, the retaliation by which the Government of the United States is to be reminded of the injury inflicted by its absurd caprice upon innocent people will, it is said, perhaps take the form of the exclusion of Americans from those great schools of art which the French have, until now, taken so much pride in holding open to the whole world; and this step would certainly seem a moderate and reasonable one. In Italy, where the fine arts are perhaps more a matter of business, and less one of sentiment, than anywhere else, a half-official newspaper article indicates that in response to the appeal of a large number of native artists, an export duty is likely to be laid upon the works of American artists resident in Italy equivalent in amount to that imposed by the United States upon the import of foreign works. As this would saddle American artists in Italy with a load under which they could not compete with their brethren at home, the result would be to drive most of them immediately back to their own country, with their families. This might please the cheap patriots at Washington, but the effect upon the prosperity of the native artists who have stayed at home would be questionable, to say the least, while the returning exiles might experience no little distress in making the change. If this step should fail of producing the desired change in the United States customs laws, the Italian Government is said to have in mind the laying of prohibitory duties upon the importation of American products of another class, holding the same relation to the industry of the United States that artistic work does to that of Italy. Such a reprisal as this would involve many more innocent persons in the same misfortune that has befallen the Italian artists, and it is to be hoped that a happy adjustment of the dispute may be made as soon as possible.

THE subject of establishing a uniform standard of time throughout the United States, which has for some time been under discussion among engineers and others, is now on the point of acquiring a very general interest, through the movement which has been initiated for the adoption by railroads of the scheme prepared by a committee of the American Institute of Civil Engineers, and generally approved by scientific men. Under the arrangement proposed, the trains upon all railways which decide to adopt the new system will run by a schedule of time taken, not from the clocks of the particular town from which they start, but according to the mean solar time of places upon certain agreed meridians, which are taken at fifteen degrees apart, so that the solar time at each meridian will vary by exactly one hour from that of the standard meridians next on either side of it. In this way, the passengers over the long roads extending east and west, instead of finding their watches, from the hour of starting, hopelessly discordant either with local or railway time, and generally with both, will during each stage of seven or eight hundred miles travel, see all movement regulated by the same time as that shown by their watches, and on entering each succeeding stage, the minute hand of the watch will still accord exactly with the local time, variations being confined to the hour hand. Those who travel much, and who have suffered from the vexations incident to the maintenance, in most places, of two standards of time, one local and the other railway time, both being also generally different by an unknown quantity from that shown on the traveller's watch, will appreciate the relief which the new system, although presenting some astronomical anomalies, would afford in practice, and it is not surprising that the officers of railroads aggregating nearly sixty thousand miles in length should have promised their adhesion to the reform. If a considerable portion of the remaining lines should follow this example, the reformed time will be at once adopted, and it is probable that the local public and private clocks will in this case soon come into conformity with the railway system.

A CORRESPONDENT of the *Sanitary Engineer* asks for advice as to the best method of preventing annoyance from the rain of condensed water which falls continually in cold weather from the exhaust outlets of steam engines. In the business portion of many cities, during the winter, it is impossible for a lady to pass through the streets without having her clothes sprinkled, and often spoiled, by the fair-weather showers which she encounters beside every building furnished with an elevator or a high-pressure steam engine of any kind, and other persons besides ladies feel the annoyance in a greater or less degree. The remedy is so simple that it is a pity that its application should not be made compulsory everywhere, as it is in New York, where, notwithstanding a very general use of steam power in the business quarters, the exhaust showers are unknown. In that city no exhaust-pipe is allowed under any

circumstances to open directly into the atmosphere. Where cheapness is the first consideration the law against open exhausts is complied with by placing an inverted cylindrical receiver or "kettle" over the mouth of the exhaust-pipe, which projects just above the roof. The stream of mingled steam and water from the exhaust strikes the inside of the "kettle," and is there separated, the water attaching itself to the inner surface of the kettle, and dripping thence harmlessly upon the roof, while the light vapor, freed from its burden, passes off and is dissolved in the air. The use of these simple kettles, which cost but a few dollars, is open to the objection that the constant trickle of warm condensed water from them over the roof leads in time to the deterioration of the roofing material; and a better, but more expensive device is used in many cases, consisting of a closed kettle, standing on the roof, and having its cover perforated with two holes, one of which receives the exhaust-pipe, bent over and downward into it, while a short piece of straight pipe is inserted in the other. The exhaust-steam is freed from its suspended water in this kettle, in the same way as in the other, and passes out as light vapor through the short pipe in the cover, and a small drip-pipe leading from the bottom of the kettle conveys the condensed water into the nearest waste-pipe or rain-water leader.

ANOTHER question relating to the responsibility of architects is propounded in the last number of *La Semaine des Constructeurs*, and answered by the Secretary of the Committee on Jurisprudence. It appears that a certain proprietor employed an architect to design a storehouse for grain. The structure consisted of three stories, of which the lower was vaulted in stone, while the floor of the upper story was supported by two girders, extending across the whole widths of the building, but partially sustained in the middle of their pan by iron columns standing upon the vaulting below. After, the girders were placed in position, and the iron columns set under them, a wooden floor was laid over the top of the vaulting, and fitted around the feet of the columns, and it was then discovered that the columns, as well as the girders which they supported, were out of level. The most obvious remedy for the mistake would have been to cut out one of the girders, and reset it at the proper level, but the proprietor was in a hurry to move into his building, and the architect, instead of ordering the error rectified, contented himself with raising the base of one of the columns an inch above the other, and inserting a plate an inch thick above a cap of the same column, so as to make up the two inches of difference in the distance of the girders from the floor. The proprietor made no objection to this compromise at the time, but when the bills came in, he notified the architect that he should hold him pecuniarily responsible for the consequences of his want of vigilance in failing to notice the difference of level in the girders before the columns were set.

THE referee to whom this claim was submitted, finding no precedent to aid him in rendering his decision, laid the case before the editor of *La Semaine*, and is answered by a recapitulation of the duties and responsibilities of architects, according to the *Code Civil*, followed by an application of the rules of the *Code* to the case under consideration. Both parts of the reply are interesting. According to the *Code Civil*, the errors committed by an architect, like any other person entrusted with work, are divided into three classes; namely, grave faults, slight faults and very slight faults. For the consequences of errors of the first two kinds he is pecuniarily responsible, but not for those of very slight faults. Moreover, if a contractor makes mistakes which, by lack of vigilance on the part of the architect, fail of detection, it is true that the architect is responsible for the consequences of them, but not as a principal; the contractor who committed the fault being first bound to repair it, and the proprietor having no ground for claim against the architect until all means for obtaining satisfaction from the contractor have been exhausted. In applying these principles to the dispute in question, it is clear that as the proprietor has not paid the contractor in full, he is still in a position to cause the misplaced girder to be reset, if he wishes, at the contractor's expense, and has therefore no ground for a claim against the architect, who is only a subsidiary, not a principal; while even if the architect were the only person from whom any indemnity could be obtained, it is by no means certain that his error, resulting partly from his anxiety not to delay the completion of the building, should not be regarded as one of the very slight faults for which no damages can be claimed.

EVERY one has heard of the remarkable assertion of Darwin, that the surface of the ground in all places not absolutely desert is continually in process of being raised by the operation of earthworms in the soil. The observation adduced by him in support of this opinion, that within some thirty years the surface of a field near his house had been raised so high as to cover the pebbles which were once scattered over it, was for a time regarded as incredible, but recent observations have shown that these useful creatures are quite capable of doing all that has been attributed to them. By weighing the "worm-casts" found at the entrance of their little burrows, an accurate measure is obtained of the amount of earth swallowed and digested by them within a given time, and in a single season a quarter of a pound of the casts have been found beside a single hole. The weight varies according to the richness of the soil, those found in poor land being much larger than those in garden soil, showing that a greater quantity was needed to supply the animals with the requisite nourishment. The number of worms to the acre, by actual count, varies in different places from fifty thousand to nearly nine hundred thousand, and supposing that each consumes, and returns to the surface in the form of friable and azotized soil, two ounces of dry earth every year, the accumulation in the course of decades or centuries may obviously amount to a very large quantity.

WITH the maximum number of worms, and a moderate consumption of earth, something like one hundred and fifty thousand pounds of newly made soil would be annually spread over the surface of the ground, forming a stratum, if the soil weighs seventy-five pounds to the cubic foot, nearly one-half an inch in depth everywhere. Evidently, the uninterrupted toil of a century would produce very marked results in this way, and it is by no means unlikely that the so-called subsidence of ancient pavements, and even of whole cities and towns, may be principally due to the exertions of insects. One of Darwin's own experiments furnishes a striking confirmation of his theory. In 1842 a quantity of broken chalk was spread over part of a field near his house, with the express object of seeing at some future period to what depth it would be buried by worms. Twenty-nine years afterward, in 1871, a trench was dug across this part of the field, and the line of white lumps was plainly visible at a depth of seven inches beneath the surface. Before measuring, the coating formed by the matted roots of the grass was carefully removed, so that no part of the accumulation was to be attributed to these. In addition to the constant top-dressing, to call it so, which is thus carried on at such an enormous scale, the continual passage of the worms through the ground must assist very greatly in aerating it, and assisting the beneficial influence of frost and sun in rendering it mellow and wholesome, while the very circumstance of the retreat of the animals to the subsoil during the winter leads to the constant introduction on their return, of a portion of the lower strata into the loam above, which it improves at the same time that it adds to its quantity.

A NOVELTY in sanitary appliances has been introduced in New York by Messrs. Abendroth Brothers, in the shape of cast-iron soil-pipes and fittings protected from corrosion by a coating of magnetic oxide of iron, produced by what is called the Bower-Barff process. The cost of treating the pipes was about one cent per pound, which does not seem extravagantly high, but even this would be diminished if the work could be done on a large scale. Two of the pipes, as we learn from the *Sanitary Engineer*, are now being tested by the chief engineer of the Philadelphia Water Department, who finds that the coating successfully resists the action of aqua-regia, and he is trying the effect of a prolonged exposure to a mixture of wet salt and ashes, as well as to pure water. From what we know of the Bower-Barff process, we should imagine that the severest test that a soil-pipe treated by it would have to undergo in actual use would be the discharge of hot and cold water alternately through it. Even with small articles it has been occasionally found that the coating of magnetic oxide was disposed to scale off, and the contraction and expansion of a piece of metal so long as a joint of soil-pipe under a temperature alternating between the freezing and boiling points of water would soon show the value of the process in regard to a quality much more important than resistance to chemical reagents of a sort never found in pipes in actual service.

WATER-CLOSETS.[1] — XXI.

SLOP *or Urinal Safes.* — All prominent firms who manufacture plumbers' supplies in this country and England furnish these safes to fit in beneath the seat and over the bowl. These safes are simply a square, dished covering for the bowl, which has either a circular or oval hole about the size of the hole in the seat, with a surface of an impervious character formed so as to conduct water or urine into the closet bowl. They are made from solid earthenware, glazed, or from iron or copper enamelled. In all cases they are useful and cleanly in fact and in appearance. Thin metal safes are the most convenient for fitting over closets in which the wood-work has already been put in position, but from the liability to chipping, which even the best enamel has, a glazed earthenware safe is to be preferred where a new closet is being fitted up. Where the closet is to be used as the urinal, a slop-safe is very important, as it prevents dripping on the wood-work or into the safe below the closet. In either case the rapid decay of urine would generate dangerous and offensive gases. A poor substitute is sometimes found for a slop-safe, by beating sheet-lead over a wooden piece shaped in a manner similar to the regular slop-safe. Although better than wood, a substitute of this kind is a mere make-shift, and should never be used in place of an enamelled or porcelain one.

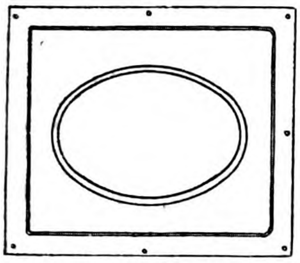
Fig. 218. — Oval Slop Safe.

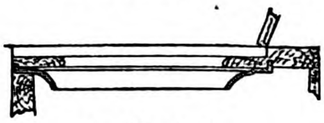
Fig. 219. — Section.

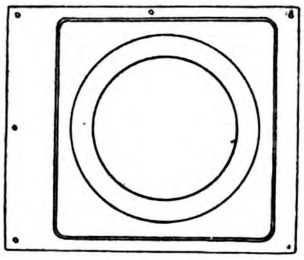
Fig. 220. — Circular Slop Safe.

WATER-CLOSET SEATS.

All are familiar with common boxed water-closet seats, often fine and expensive pieces of cabinet-work, fair without, but foul within. These boxes secrete dust, dirt, and in many instances leakage and drippings from the closet. Seats of this kind, when made in their best form, have both seat and riser to open upon hinges, stout brass ones being the best: iron rusts easily, and the hinges become useless. When the riser and seat open, the housekeeper can easily see that this space is kept clean.

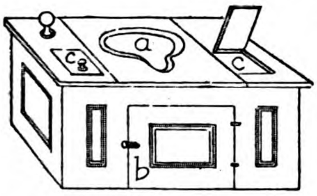

Fig. 221. — French Closet Seat.

a, Seat. *b*, Door in riser. *c*, Paper-box.

A convenient shape for the hole in a seat is egg-shaped, eight inches wide and ten inches long, and commencing about three inches and a half from the edge of the seat. This form of hole was patented in England thirty years ago. The manner of such work must be in keeping with the other wood-work in the bath-room. Heavy rubber duck is sometimes used instead of brass for hinges to the seat. Mr. Leeds's method of making a seat and riser that would be easily moved is illustrated in the *American Architect*, Vol. VII., No. 223.

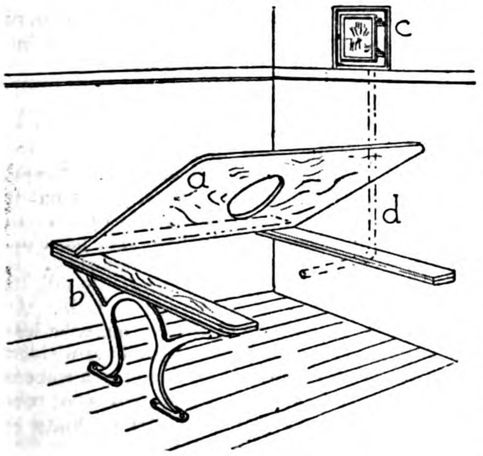

Fig. 222. — Open Seat.

a, Seat. *b*, Legs. *c*, Gas-jet for ventilation. *d*, Ventilating-pipe.

I take an illustration from Liger of a French panelled box water-closet seat. The riser has a panelled, hinged door. The hole in the seat is decidedly pear-shaped, being very much like the ones represented in the closet from Herculaneum (*American Architect*, Vol. XIII, No. 373), which must have been in use more than eighteen hundred years ago.

I give here two illustrations of what I consider the best forms of water-closet seat. The seat is supported by legs, which may be as ornamental as desired, and should be of some impervious material. The seat itself consists of a simple hinged leaf or board with a hole in it. A seat of this kind is furnished with the Brighton closet (Fig.194). When not in use, the seat is turned back against the wall, exposing the white porcelain closet setting on a white or colored glazed tile floor, producing a neat appearance, and it is in fact very cleanly and easily cared for. A seat of this kind may be used with any form of closet except those which have unsightly or complicated parts that require concealment. The illustration shows a ventilating pipe that is intended to create a current of air from and through the closet bowl, carrying off any local offensive odors that may occur.

In Figure 223 is shown a seat, the front of which is supported by legs, a slop-safe and tank in position. This arrangement as furnished by J. L. Mott & Co. has either brass or nickel-plated legs, which are intended to rest upon a tile floor. Similar seats of this kind, having plain iron legs, are furnished by the different manufacturers. The slop-safe is let into the frame of the seat. The seat proper being thrown back against the wall when it is not in use, leaves the enamelled surface of the slop-safe exposed. This closet is flushed by the weight of the person using the closet. The seat presses down on a short lever, which communicates motion to the valve of the tank, by means of a lock chain. The floor and side of the bath-room are intended to be tiled. It is scarcely necessary to say that this makes a clean, healthy and efficient apparatus for the purpose it is intended to fulfil.

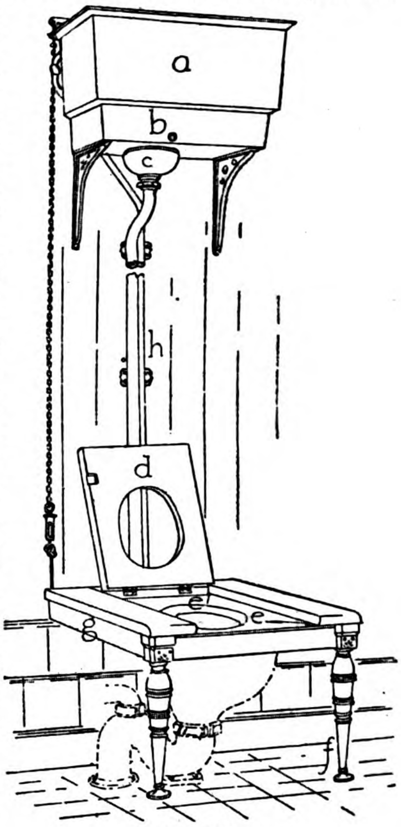

Fig. 223.

a, Tank. *b*, Service-box. *c*, Flushing-pipe. *d*, Seat. *e*, Slop-safe. *g*, Seat-frame. *h*, Supply.

For prison use, or in places where the same abuse is likely to occur, it is best to use a jump-up seat like the one illustrated in Figure 224. The seat is oval, formed of wood, and is just large enough to cover the bowl of the closet. Two iron journals are screwed, by means of an iron plate from which they project, to the wooden seat. One side has a lever and weight attached to the journal. By means of the weight the seat is kept thrown back against the wall, unless it is held down over the bowl by a greater weight.

Fig. 224. — Jump-up Seat.

a, Weight. *b*, Lever. *c*, Journals. *d*, Seat.

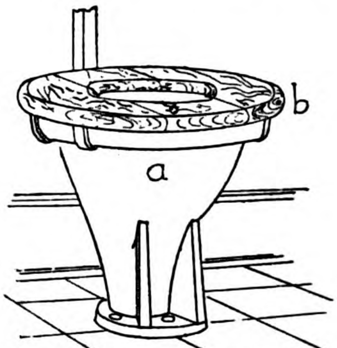

Fig. 225.

a, Closet. *b*, Seat. *c*, Clamp.

Sometimes the long hopper porcelain closet is set on a tile floor and has a wooden seat which is held in position by iron clamps, that are clamped around the earthenware rim.

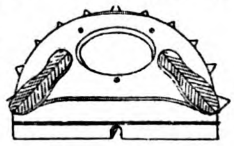
Fig. 226.
Seat for Standing on.

Liger describes a closet seat or stand which is intended for use in the crouching or Oriental fashion, instead of as a seat. Places are arranged for the feet, being made rough or ridged, so there will be no danger of slipping.

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[1] Continued from page 178, No. 407.

Levers. — It seems advisable to describe the two following simple levers for opening the valve in the flushing-tank by pressure on the seat: —

Fig. 227 is a double lever which has its pivots or fulcrums attached to the under side of the seat. Motion is imparted to the first lever by pressure on the seat, while it in turn moves the short arm of the second lever. The long arm of the second lever is connected by a chain with the lever that operates the flushing valve in the tank.

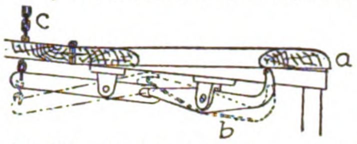


Fig. 227. — Lever for opening Supply-Tank.

a, Seat. *b*, Lever. *c*, Connecting-chain.

The arrangement used by Henry Huber & Co., of New York, in connection with his "Tidal Wave" closet is simple, and not liable to get out of order. It is a simple lever which moves up or down on two journals, the bearings in which they work being screwed to the floor. The lever is pressed down by rods which are attached to it; these run through guides and come in contact with the under side of the seat. The weight of the tank lever keeps the seat slightly raised unless there is sufficient weight on the seat to counteract its effect.

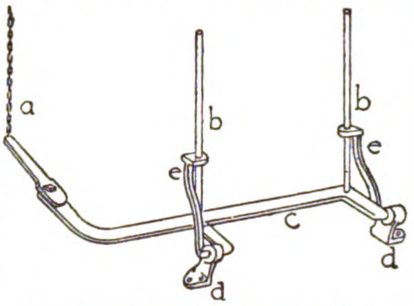


Fig. 228. — Lever for opening Supply-Tank.

a, Lever. *b*, Journal. *c*, Rods.

Bidet Attachment. — Cragie's bidet attachment is a small branch from the supply, that is attached to the inside of the water-closet bowl. When not in use it is turned up under the seat or urinal safe; when in use, it is turned down into the centre of the bowl. From it a small jet or spray of water is thrown up toward the seat. This attachment is important in some diseases.

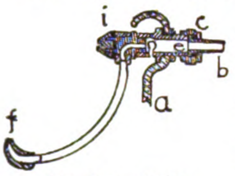


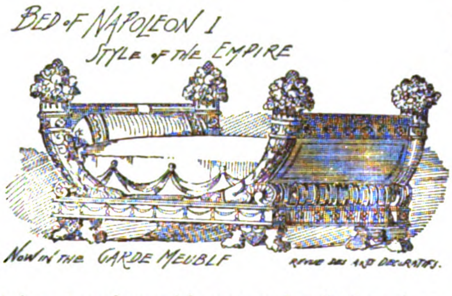
Fig. 229. — Bidet.

a, Bowl. *b*, Supply.
c, Nut. *e*, Valve.
f, Nozzle for jet. *i*, Packing.

Quite a number of devices have been invented for the purpose of disinfecting water-closets. These "germicides," as some of them are called, are intended to destroy germs and odors that may be generated in receivers or other concealed compartments that may be connected with badly designed water-closets. Instead of using disinfecting apparatus and a bad or poorly constructed closet, it is far preferable, both on the score of health and comfort, to select a simple, cleanly closet, with its trap properly connected with the soil-pipe and ventilated, and thus have no need of a "germicide." GLENN BROWN.

THE END.

A FRENCH CRITIC ON CURRENT FRENCH ART.



IT would be a little late in the day to translate for the readers of this journal a mere review of the works of art shown at the Paris *Salon* of last spring; but a series of articles by M. Charles Bigot recently completed in the *Gazette des Beaux Arts* contains, together with many detailed notices of individual pictures then exhibited, certain conclusions drawn by the author from the collection as a whole — conclusions which seem to me so true, so interesting and so instructive that I have ventured here to reproduce them in a much abridged form.

M. Bigot begins by saying that his chief aim will be to answer certain questions which have been often propounded in recent years: Whence has come and whither is going the French art of to-day? Is it progressing or retrograding, or is it simply holding that note of respectable mediocrity which has been for some time its dominant accent, — equally removed from platitude and from fertile superiority? Is it simply straying right and left upon uncertain paths, or beneath all the varieties of manner, and all the petty schools and sub-divisions which characterize it, can one recognize a preponderant current, a general direction toward which it collectively tends with such force and directness as to enable one to say what will be the French art of the morrow? And if such a current exists, of what sort is it? Is its tendency for good or for evil? Have we reason to rejoice over or to lament its prospects?

The author notes that no time could be more propitious for the making of such an inquiry than the present moment, for never before in our day has French art been so completely free, so delivered from the control of government or authority of any kind, so entirely given over to the conduct of its own professors. The annual exhibitions are arranged and presided over by artists chosen by the whole artistic voice of Paris. The Government buys what works it sees fit, but no longer prescribes into what channel, or according to what aims the painter should direct his activity. The innate tendencies of the time are, therefore, to be traced with the utmost confidence that they are natural tendencies, and are not due to that outside official influence which has so often moulded or tried to mould the art of France.

In art, continues M. Bigot, there are two factors — the subjects treated, and the manner of their treatment — the thought, so to say, and the expression or style. Two points are, therefore, to be noted in the present examination: first, whither tends the inspiration of the artist—towards what description of subjects is he most strongly drawn? and secondly, is it possible to discover to-day, amid all the various methods of practice that are adopted, one style which attracts more and more such men as have not passed the age when it is still possible to learn?

To the first and most important question, which will alone concern us here, the author says he has no hesitation in giving an affirmative reply: "Yes, the course of modern art is marked out to-day. For some years past a movement in a certain direction has been noticeable, and with each *Salon* it has become more evident; but never has it been so patent as this year. Here lies, to my mind, the great interest of this exhibition of 1883. For a quarter of a century a revolution has been preparing in the realm of French art — one of the most important æsthetic revolutions that history has ever seen—and this revolution is now accomplished. A single word will indicate its character. It is in contemporary life, in the ordinary current life about us that our artists are seeking ever more exclusively their inspirations."

Then in a brief but masterly little sketch the author explains the state of things which worked through many generations of French artists, to make such an attitude on their part to-day assume nothing less than a revolutionary character. From its earliest days French art was never national in so far as the choice of its materials went. It was founded on the example of the Italian schools, and never threw off this yoke, as did the painters of Holland when they grew into an indigenous, characteristic school. It became an established belief that outside of religion, mythology, history and allegory there could exist no "high art" worthy of the admiration of respectable men, or of official recognition. Government schools and corporations, like the Institute, in assuming control of the education of the young, in distributing the prizes at competitions and the academic consecrations of talent, aided in fortifying these predilections which earlier influence had created. Even the landscape painter did not dare to look about him and paint his own country, but must needs seek inspiration in the "classic" landscapes which had formed the first great masters of his country. Such was the condition of things at the middle of this century, for even Delacroix, in spite of the epithet of "revolutionary" which clings to his name did not inaugurate a real revolution. He renewed, by his novel treatment, the time-honored subjects of his fellow-countrymen, religious, allegorical, historical or mythologic. He scandalized the conventional academicians of his time by his daring, novel, individual practices in color and design, but his *ideas* were not new. He altered the current practice of the century, but not its current ways of thinking about its art.

The revolution really began with the great landscapists of the generation of 1830—with Rousseau, Dupré, Corot and Daubigny. These broke, indeed, with the traditions of the schools in aim and idea, no less than in technical practice. Instead of painting the traditional classic landscape they opened their eyes and saw contemporary France, and put it as truthfully as they could upon canvas. They had a long and bitter fight before they could obtain a hearing, much less any shadow of official recognition, but finally they triumphed and most completely. It is impossible to believe that even the oldest and most "academic" member of the Institute would to-day recommend a young artist to take Poussin rather than Corot or Rousseau for his teacher.

While this long battle was going on in the domain of landscape, the "high art," which was still taught in the schools, protected by the academies and sustained by the State, was gradually dying. In vain orders were multiplied and rewards were lavished. The more the official voice tried to glorify "high art" the more it languished. It had arrived at a point where it was impossible to infuse life into its veins—at the point of being a mere system of learned rhetoric. At the schools pupils were taught an infinity of things, more or less valuable in themselves, but powerless to produce good art without the inspiration of that essence which cannot be taught — a sincere emotion, an artistic soul. The public passed unmoved and cold before a thousand canvases which every year it felt itself obliged to pretend to admire on account of famous signatures and governmental indorsement. Forty years ago the cry went up "High art is dying, is dead." Its professors sought in every way to renew its life. There began the reign of what is called the picturesque in art, the movement which sought new success in novel themes, which went far afield to search for new impressions, which opened up the East and the South, which ransacked the pages of mediæval history, for the reason that Greece, and Italy, and the stories of classic times seemed to have lost their charm. For a moment the object seemed attained. The new themes were admired for their novelty, and it looked as though art had been reborn; but familiarity soon bred indifference, and it was found that Algiers and Egypt, the court of

Louis XIII and of Marie de Medici were not more likely to inspire a really vital development in modern art than were Italian landscapes, or scenes from classic history and mythology. It is easy, says M. Bigot, to name the painter to whom is owing the regeneration we recognize to-day, the one who first entered upon the new, and we believe, the true path, and whose example has gradually attracted to his side the strongest brushes of the living generation — Jean François Millet. He was the first to do for humanity what his contemporaries already named did for external nature — to show that its contemporary phases, even in their lowest social forms, are equally able with history, mythology or tradition to furnish high inspirations to the artist. Without altering, embellishing, idealizing his humble contemporaries, without making them the vehicle of amusing, pathetic or dramatic anecdotes he yet succeeded in producing works which amply justify their inclusion in the catalogue of high art. He saw their grandeur as well as their roughness; he painted them as they are, but with the recognition of their finer as well as their ruder qualities; he loved them, and understood them, and showed not only their poor clothes, their bent forms, their fatigue and their ugliness, but their courage, their dignity, their energy, their patience, their simplicity, their humble joys and sufferings, the beauties of their souls and characters; in a word, he saw them with the eye of a true artist, which transfigures while it does not alter everything upon which it rests.

From the day of Millet's advent we may reckon the Renaissance of high art in France. He opened the way and there came many to tread in it, to see not only the peasant but all his fellow-citizens in the social body as thankful subjects for the brush, provided that brush be inspired by true artistic sensibility, by good eyes, by sincerity of heart, and by poetical emotion. Such a movement cannot be completed in a day. Millet himself was not recognized till he was already dead, and neither the whole body of French artists nor the whole body of the public has yet gone over to the new school. Still one may say to-day that the revolution is accomplished, and is sweeping away with it even those who most strenuously resisted its influence, and distrusted its direction. For a dozen years back no attentive eye could mistake the tendency of French art; each *Salon* has manifested more clearly than the previous one the direction the young school was taking, and to-day no one can be blind enough to mistake the matter. Never was more clearly seen than in the exhibition of 1883 the end of one art and the advent of another.

In this brief review M. Bigot does not mention Courbet's name, but he surely deserves to be cited as equally influential with Millet in the inauguration of the new art. His protest was as radical, and more violent; the opposition to his work was even more bitter than was that to Millet's; and the victory he has recently won over official conservatism is the most striking example that could be cited of the triumph of the new ideas. At the sale of his pictures held a year ago in Paris the same authority which once denied him admittance year after year to the *Salon* and loaded his work with every condemnatory epithet, saw fit to buy for the galleries of the Louvre and for various provincial museums a number of his pictures, and to pay for them the most extravagant prices. Courbet in the Louvre as a triply-honored guest is indeed a proof that, as M. Bigot says, "the revolution has been accomplished."

Our author then proceeds to make the rounds of the *Salon* of 1883, looking first at what he calls "*l' art qui s'en va.*" In the way of religious art he finds so little that is good — good, that is to say, by truth and force of sentiment and not merely by technical ability — that he concludes we must indeed resign ourselves to seeing no more at present of "religious high art;" neither in the would-be sacred pictures of M. Carolus Duran nor in those of any of his fellow workers does he find any religious feeling worthy of the name. With mythology the case is not very different. No one believes to-day in the phantoms of Greece and Rome as they believed in Renaissance times or even in the days of Delacroix. The nymphs and goddesses of the moment are but undraped Parisians in whom it is evident that even their portraitists saw no classic spirit. Only two men can be excepted from this verdict, only two really seem to feel what they try to make us feel — the actuality of the dreams they paint. These are M. Henner and his pupil, Benner. Even when the former tries to show us a Magdalene he shows us a nymph undistinguishable from her sisters who are so called. Allegorical painting is at the same low ebb — often undertaken with consummate technical skill, but never with the true inspiration which made such works valuable in earlier generations. Historical painting is a little more alive, but M. Bigot seems to think that many of the best essays here shown this year are hardly prophetic of more to come, being the work of young men still feeling their way, still unemancipated from the fetters of academic instruction, many of them still pensioners of the Villa Medici and so obliged to defer to the official traditions of bygone days. Even so there are fewer successes in this direction than might be expected. Only one or two are worthy of much praise, chief among them being the "Andromache" of M. Rochegrosse, who obtained a first-class medal for his canvas. In *genre* too, while many older painters persist in their time-honored ways and produce pictures of more or less exalted merit, no great successes are to be noted as signed by rising hands. The anecdotal painting which has held so large a place in French art during the last twenty years, which has ransacked all history and all nations for its scenery, seems to M. Bigot to be on its last legs. "The great vogue of *genre* is passing away," he says, "and it is not I who will complain."

Then the writer turns his attention to the more satisfactory part of his subject, to the art which is not only living but growing visibly in strength and fertility from year to year. First he acknowledges "the continued fine attitude and success of the landscapists," each of whom according to his individual tastes and aptitudes visits the highways and byways of France, painting the sea, the shore, the field, the forest, the wide plains and horizons or the dusky corners and verdant nooks of his native country. No one remains of the great generation of 1830 but the veteran Dupré, and M. Bigot acknowledges that none of the young men are quite their equals. But there are many excellent artists who follow in their paths, not servilely, but each after his own gifts. At least sixty landscapes in this exhibition, he explains, are worthy of all attention and all praise.

Of portrait painting there is an equally flattering tale to tell; but portraiture, says M. Bigot, has always done well in every age of art, for here the painter has always been obliged to go direct to nature in his work. Even in the deadest age of French art, even amid the banalities of Rococo days and the frigidities of the time of Ingres, portraiture flourished. The coldest classicist, the most frivolous boudoir painter, has left us fine, vital, and interesting likenesses of his contemporaries. But the *Salon* of 1883 need be afraid of none of its predecessors in this department. Many works prove, of course, that the display of his technical ability has been the first or the only consideration in the painter's mind. But dozens of others show, together with technical ability, great power in the perception and rendering of character, and a firm adherence to the plain aspects of contemporary life. M. Bonnat, M. Paul Dubois, M. Delaunay, M. Desboutin, M. Edelfeld, and our own painters, Mr. Julian Story, Mr. Sargent and Mr. Healy, are among those picked out for especial praise. Mr. Whistler's portrait of his mother — so well-known in this country — is praised for its truth, its simplicity and the unity of impression it conveys. M. Bigot takes some exception to the technical method of Mr. Whistler and finds him rather an engraver than a painter. Many other judges would dissent, I think, from such a verdict, but would agree with our author in acknowledging his sincerity, his force of will, his patient observation and his artistic self-respect. It would go ill, he adds, with any one who might try to imitate Mr. Whistler, but he is entirely *himself*, and it is this which above all things counts in art. It is a pity that readers of the *Gazette* should have to make acquaintance with this noble work through a cold, poor, and inexpressive etching by M. Guérard which accompanies this article.

But, the author goes on to say, the most interesting feature in the exhibition is to be found in the pictures of contemporary life, the subjects drawn from reality, in which humanity in all its complexity is displayed before us. It was long a theory in France that contemporary life might only be represented in small *genre* subjects, but we have broken completely with this tradition and no longer fear to present its themes on canvases of the size we accord to so-called historical works. But what we must always ask from their authors is that they should be above and before all *painters* — that they should not seek to interest us by any other means than those which are legitimate to art. As soon as they are seen to be more concerned with an idea than with their painting, to seek for subjects melodramatic, pathetic or sentimental, to strive to enforce a moral or social lesson, we distrust them at once: we resent their attempt to force our attention and to speculate on our sensibilities. Turn to literature, says M. Bigot, if you wish to *prove* anything. Art cannot bend itself to theories, and if it ever demonstrates any such it is when it has thought least about them. So he condemns all such pictures as, with titles like "Drunkenness" or "November," try to preach sermons and not merely to depict scenes. The figures may be from contemporary life, but they are as dead and uninteresting as the most classical allegory of them all. The artist must look at things simply and sanely, with no other preoccupation than for his art, and must show them as he sees them. This has been done this year by many painters, young and old, who have portrayed the men and women of France under a hundred different aspects and engaged in a hundred different scenes. The nature of the subject is not that which tells the most — the chief factor in the result is the soul of the artist. There is in the most humble and apparently vulgar incident a hidden poetry; when the artist is able to see and express this (without "idealizing" his theme) his work is entitled to rank as "high art." Among the best pictures in this respect M. Bigot signalizes those of M. Lhermitte, who concerns himself with peasant life; of M. Gervex who paints a Charitable Bureau; of M. Tattegrain who shows a fishwife and her children wading into the sea to receive the dead body of her husband; and those of M. Israel, M. Bastien-Lepage, and M. Jules Bréton, the work of whom is too well known in America, I hope, for me to need describe its qualities in this place. M. Renouf also comes in for a large share of praise.

M. Bigot then sums up by saying that the coming generation must apparently resign itself to doing without both a great historical and a great religious painter. Perhaps, he says, this is an effect of that democratic spirit which has been steadily growing in France during a century past. The man of to-day is so interested in and so concerned about to-day that he has no thoughts to give to either the history or the ideals of past ages. But that which he *does* understand and love is the present, is contemporary life. It is this which attracts the painter, which touches the public; it is through this that morality, duty, poetry, the whole of life must be expressed. "I am not of those who view such a transformation with inquietude. On the con-

trary I hail it with confidence. The years of crisis and anarchy for the French school are overpast; the rout of the superannuated schools is finishing in confusion; the new path is open and free. I do not care to attempt the rôle of prophet, yet I shall be cruelly disappointed if so many patient, courageous, and earnest efforts are to end in futility. For that it would need that the youth of France should lack heart and energy and should wreck themselves and us. Either I am greatly mistaken or else those who live in 1890 are destined to see fine painting."

In conclusion M. Bigot addresses a word of warning and advice to the young artists of France, saying that they must be wide awake if they do not wish to see their laurels torn away from them. France no longer has the monopoly of art as she had in former years, and as Italy had it in the sixteenth century. "The frontiers of art are abolished; emulation has seized upon every nation; everywhere with equal ardor young men are drawing, painting, looking at nature and at life. If foreigners for long have come humbly to French ateliers for their instruction, it has merely been in order that they might learn to fight us in the hopes of final victory." Then the author mentions the best among the foreign contributors of 1883, and warns his countrymen that they are dangerous competitors. It is interesting for us to find that among the seven names thus cited four are of Americans — Mr. Story, Mr. Whistler, Mr. Sargent, and Mr. Pearce.

May I now add a word on my own account — addressed not to the young painters of France but to those of America? They are bound by none of the traditional fetters, none of the academic formulas, none of the survivals of past ages which long hampered the artists of France. It would seem as though no men had ever entered upon their career more free from outside pressure, more likely to open their eyes to the contemporary life about them and to paint it with originality if not always with genius. But a bond of another kind has been threatening to choke and distort our art. The danger is not yet passed, though I think it is apparently now a little less grave than it was a few years ago. This bond is their adherence to the contemporary example of foreign schools, especially of those of France. When a Frenchman of some twenty years ago first painted French peasants, French street-scenes, French landscapes, he did that which it was right and natural for him to do. But when the American of this moment confines himself to such themes he sins in somewhat the same way as sinned the earlier French painters who clung to the nymphs and warriors and landscapes of Greece and Italy. He is conventional, imitative, non-natural. He is not painting those things which lie nearest to him and in which he must feel the most vital interest, but those which are now conventionally regarded by "the schools" as especially suited for artistic purposes. A few of our men have already shown that our own land, even in its least picturesque aspects, is as thankful a subject for the brush, when properly regarded, as are the fields and coasts of France. Our young school of etchers has done especially good work in setting this example; and such men as Mr. Fuller, Mr. Homer, and Mr. Eakins are acting both in their own interests and in those of American art as a whole when they apply their talent to native themes. The best instruction may be obtained abroad undoubtedly, but after returning home it is neither necessary nor wise to keep reiterating the themes proper to the painters who have been one's masters there. The days have gone by, I think, in this country as in France, when conventionality of any kind can succeed in art. And, I repeat, it is just as conventional for an American to keep on painting his reminiscences of French scenes, as it is for a Frenchman to cling to the classic subjects of his fathers.

M. G. VAN RENSSELAER.

THE ILLUSTRATIONS.

THE LIEBFRAUENKIRCHE, TREVES, GERMANY. MEASURED AND DRAWN BY MR. FRANK ZIMMERMANN.

THE corner-stone of the Liebfrauenkirche was laid in 1227 under the controlling influence of the archbishop Theodoric. In 1247 (twenty years after it had been begun) the church was completed as shown in the drawing. Noted German and foreign archæologists have directed their attention toward this monument and find that, even if the structure was not built in imitation of French buildings, the French churches had exercised considerable influence. Every architect will observe when looking at the drawing that the entrance is built in Romanesque style, while the upper portion and roof are Gothic, and the steeple again Romanesque. This has led to the supposition that after the death of the architect who began the church, a younger architect was entrusted with the work, and that he, full of enthusiasm for the just developing Gothic architecture, continued the building with a purity and perfection which is still imitated and admired.

A third architect seems to have been employed to build the steeple, but either unable or unwilling to grasp the new style of architecture, he finished the church in the predominating Romanesque style and in the spirit of the first architect. The structure is entirely of sandstone. The names of the architects are unknown.

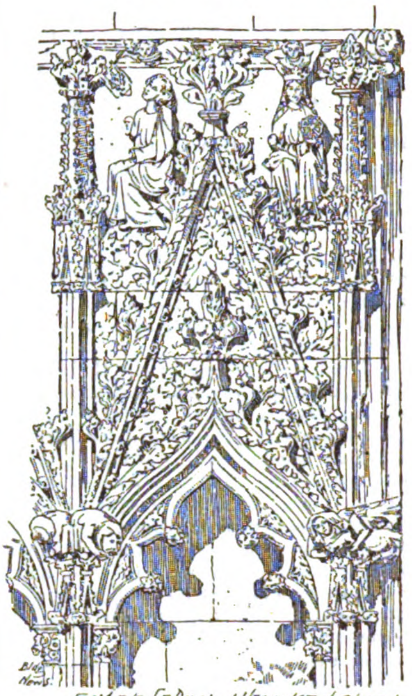
HOUSE ON WAYNE ST., ROXBURY, MASS. MR. GEORGE MOFFETTE, ARCHITECT, BOSTON, MASS.

HOUSE OF COL. J. D. PLATT, DAYTON, O. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

"THE EVERETT," BACHELOR APARTMENT-HOUSE, WASHINGTON, D. C. MR. JOSEPH HORNBLOWER, ARCHITECT, WASHINGTON, D. C.

THE VAN SCHAICK FREE READING-ROOM, WESTCHESTER, N. Y. MR. F. C. WITHERS, ARCHITECT, NEW YORK, N. Y.

LECTURES ON ARCHITECTURE.[1] — IV.



FROM THE SEDILIA IN HECKINGTON CHURCH. LINCOLNSHIRE. ENGLAND

IT is a gratifying circumstance that the greatest attention is now being paid to the revival of the Gothic style. In England Mr. Pugin alone has designed no less than twenty-three fine churches, and superintended their erection within the past two years. And in our own country it is evident that a rapid advance has been made in an acquaintance with its true principles. No one can doubt this who has seen the new Trinity Church in New York, rising, in almost all the grandeur of the Old World edifices, on our western shores. We trust that before many years have elapsed, we shall see among us more churches like this, which is indeed truly worthy of the name.

Trinity Church stands in Broadway, opposite the head of Wall Street, on the site of the old building of that name, a flimsy edifice erected in 1788. The former church presented no great beauty of appearance, and upon an examination with a view to extensive repairs, was found to be so much decayed that it was at once decided to take it down, and erect a new structure, more worthy of the increased wealth of the parish. A design having been prepared by the able architect, Mr. Upjohn, it was accepted by the building committee, without any attempts at improvements on their own part as is usually the case in Boston, and the works were commenced soon after. The church is now very rapidly advancing toward completion. In size, in the delicacy and propriety of its decoration, and in the beauty of its general effect, I have no hesitation to declare that it surpasses any church erected in England since the revival of the pointed style. I have seen no account of any one, which will bear a comparison with the complete propriety and finished elegance of this American structure. Governed by simple and consistent principles, Mr. Upjohn has conceived and finished it in the true and delicate spirit of the chastest period of the Gothic style. Instead of presenting an indiscriminate mixture of all ages and styles, from the Crusades down to the Revolution, it rivals the accurate taste of the best works of the fourteenth century, and is carried out upon a scale which it would have been thought impossible to adopt, in a country where architecture is in so chaotic a state as our own. With the single exception of the chapels and private chantries introduced by Mr. Pugin in his engraving of a perfect church, which, though required by the Roman Catholic ritual are very properly omitted in a Protestant church, it very nearly resembles that enthusiastic ideal of an ecclesiastical edifice of the Middle Ages.

The extreme length of this superb structure is 192 feet. The tower and spire, which rise aloft with an airy grandeur resembling that of the celebrated church of Louth in Lincolnshire, are terminated by a richly carved cross at the height of 264 feet from the ground. The width of the nave between the columns is 37 feet, and the width of the whole church, in the clear, including the aisles, is 84 feet. There are nine equilateral arched windows on each side of the nave, corresponding in their position to the interior spaces between the piers. The clerestory is unusually lofty, and from its numerous windows will pour down a flood of checkered light upon the marble pavement below. The great window at the end of the chancel is the largest in the building, being 28 feet wide, and 44 feet high; it has fourteen principal compartments which are to be filled with painted glass. Under this window stands the altar, — the pulpit is designed to be placed against one of the large columns about halfway down the nave. The organ is to be placed on a highly sculptured stone screen, over the entrance from the tower. The pews are designed to be of black walnut with characteristic panelling, and are to occupy the nave only. I have recently been assured that the entire cost of this truly splendid structure will not much exceed $300,-

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[1] Extracts from a lecture by the late Mr. Arthur Gilman, delivered before the Lowell Institute, Boston, in the winter of 1844–45. Continued from page 177, No. 407.

000. I forbear, however, to make any direct comparison between this building and an unfinished one in our own city, upon which more than $800,000 have already been expended. . . .

A beautiful church is now in process of erection in the neighboring city of Providence, from the designs of Mr. Upjohn, in which the tower is placed on the corner. When completed, I cannot hesitate to think it will be the finest ecclesiastical structure in New England, though the whole cost is estimated to fall under $40,000. There are many churches among us which have cost a much larger sum, it is true — but in an undertaking of this kind, we see the striking significance of Pope's advice, to be

"Profuse of genius — *not* profuse of gold."

It only needs a few such examples in our vicinity to invert the whole taste and character of our present inelegant and unmeaning structures. With regard to our own churches in particular, we may safely ask "What has architecture hitherto done for Boston?" . . .

From what has already been advanced, it will not, I hope, be thought too much to conclude that whenever a church of any considerable dimensions or expense is to be erected, it should be conformed as nearly as possible to the examples of the Gothic style. This class of edifices therefore may be considered as safely provided for; but the question will very naturally arise "If Grecian architecture, from its marked unfitness for our wants and uses is ever to be generally laid aside, where shall we next turn for examples in ordinary use, or what is there that can be proposed as a substitute for it in secular buildings? Our architects have so long been accustomed to rely upon it entirely, and to clothe everything with the same Grecian garb, that they are almost entirely unacquainted with any other style of building. . . ."

Mr. Gwilt in his rapid sketch of architecture during the reign of George III, observes that mischief was for a time induced by the absurd attempt to adapt without discrimination the pure Greek porticos of the temples of Greece to public and private buildings, with which they have no more natural relation than the interior arrangement of a church has with that of a theatre. This, to be sure, is a somewhat unfortunate illustration, when we consider how things are managed in that respect among ourselves. But it is, perhaps, some excuse for him that he does not reside in Boston, nor do I know that he ever visited the place, or he would have found that in our American Athens, churches and theatres change character with but little difficulty, and just according to the taste and fancy or perhaps the interest of the stockholders. We must therefore set down the author of the great Encyclopædia of Architecture as an ignorant and presumptuous foreigner, unacquainted with the peculiar practices of this independent and enlightened people, with the talent evinced by our architects, and the discriminating taste of their employers; but be this as it may, Mr. Gwilt must be my authority for the statement that the English architects of the present day "seem at last, to be aware of the impossibility of applying with success, the forms of Grecian temples to English habitations, and a better system has been returned to, that of applying to *every* object, a character suitable to the purposes of its destination." These are his very words, and they certainly seem very plausible; but after his shocking ignorance in regard to there being any possible distinction between the character of a church and that of a theatre, I fear that many of our architects will look upon him as very suspicious authority.

Mr. Papworth, for a long time the Vice-President of the British Society of Architects, made a right step in advance. Mr. Hope, and Mr. Trotman, Mr. Barry, Mr. Lamb, and Mr. Gilbert Laing Meason, beside many others, have since shaken off the absurd restrictions with which their art was fettered. The consequence is that a beautiful, natural and convenient style of villa architecture has been introduced. General information upon the subject was diffused by Mr. Hope's elegant works and by the numerous publications of Mr. Loudon, and in our own country Mr. A. J. Downing, of Newburgh, has put forth two highly respectable volumes, upon the modifications of domestic architecture which are best suited to North America. In these works, the general principles are well laid down, and the author evinces great good sense in his theories; but I cannot think that he has been so successful as could have been wished in reducing them to practice. There is not a single design in either of the volumes that a man of good taste could desire to see executed. I cannot believe that in any of them the author has satisfied his own true ideas of expression and beauty in domestic architecture.

Nowhere, perhaps, in the whole civilized world is there a finer opportunity for the display of domestic architecture than in the vicinity of Boston. In several instances these natural advantages have been happily turned to account. During the last year a great improvement is visible in the style of our suburban cottages and villas, as no one can fail to remark who compares the frequent Gothic and Italian structures with the Greek ones, which were the only kind erected five years ago. There is one villa, indeed, in this vicinity which taste might in vain attempt to surpass, and which I am free to confess that I view only with increasing pleasure and admiration. This is the pure Italian manner — but most happily adapted to the wants and uses which were to be considered in its erection. With an example of equal importance in the English or Gothic manner, we should have more to boast of in domestic architecture than we are likely to find in our public buildings for many years to come. The forms and character of a house like this are admirably suited to modern purposes. It is not a copy from any one of the works of the Tudor period, but treated in the spirit of that style, and applied, so far as it properly can be, to a modern habitation.

It is obvious that the first point to be observed in the construction of a country residence is, that the outline of the house and its offices should blend agreeably with the surrounding scenery, and harmonize with the character of the situation in which they are placed. Whatever alterations may be made in the grounds about them should be managed, also, upon the same rule, and the whole should be made to accord as nearly as possible in a perfect unity of expression. The ingenious Mr. Hope has ably exposed the contradiction of "launching from the threshold of the symmetric mansion, in the most abrupt manner, into a scene wholly composed of the most unsymmetric and desultory forms of mere nature." It is beyond dispute that certain characters of ground and scenery have a distinct analogy with certain styles of architecture. It does not seem very difficult to understand that an English Gothic residence, with its irregularity of ground-plan, its endless diversity of form and outline, its

"Quaint fantastic chimneys, with their store
Of twisted, carved and lozenge-shaped device,"

belongs of right to a hilly and irregular surface — that the general aspect of its environs should be rather rude and unadorned, and that it would seem ill at ease amid the tame or rich scenery that so charmingly befits the terraces, arcades, piazzas and balconies of the Italian style; but we doubt if, until quite lately, our gentry have often paid the least attention to this obvious rule. In most cases they seem to have proceeded to lay out their villas and cottages without any definite intentions of effect, and with very little knowledge of how the whole affair will turn out in the end. Very little difference is anywhere observable in the process. Precedent, strict precedent has been the evil genius of the art, the trumpet sound of the employer, and the almost invariable trammel of the architect. The Greek-temple house painted a staring white, and ornamented with Venetian blinds of the most intense shade of greenness has everywhere been set down among the rich woods and varying slopes of the country, as if to extend the angularity of the mansion into direct conflict with external nature, and, if possible, to overpower her wild variety with the unmeaning effect of this poor attempt at art. The plan of the town-house, in fact, with all its compact arrangements and concentrated accommodations has been transplanted to the open fields, and the incongruities which are the unavoidable result remain without remedy, at least, if not without detection. A number of composition urns, or wooden statues are, perhaps, placed about among the grass, as at the famous groves of Blarney:

"Statues glowing that noble place in,
All heathen goddesses most rare,
Homer, Plutarch, and Nebuchadnezzar
All standing naked in the open air."

But these, too, are most carefully placed, and most exactly balanced, and the self-satisfied proprietor then retires to his Doric colonnade made of pine wood, glued together in nicely jointed pieces, to read Thomson's "Seasons" and Phillip's pastorals, and imagine himself in complete rural trim. No wonder, in view of these absurdities, that the matter-of-fact business man should often have forsworn the country altogether, perhaps without fully understanding the reason why, and shutting himself up at home, with his Turkey carpets and sea-coal fire, thanked the gods, like Audrey, that had not made him poetical.

Now, the universality of this style of building and planting is by no means an argument in its favor. Were it admitted to have any share of real merit we might still venture to depart from it sometimes in the hope of obtaining that little spice of variety which the proverb so strongly commends. Invention and change are not, I am well aware, synonymous with improvement; but in an instance like the present, where to alter is at once to benefit, and where every departure from immediate precedent is, by so much, an addition to convenience and enjoyment, it would appear that we cannot too soon be emancipated from the uniformity of which we have to complain. Perhaps there are some persons who will be inclined to draw a conclusion favorable to the present system, from the fact that no other has been understood or practised among us. They do not care to oppose the example and opinion of everybody about them, no matter what amount of taste or knowledge of the subject they might be willing, individually, to accord to them. When the Vicar of Wakefield's horse was so gratuitously depreciated by the sharpers at the fair, the worthy man acknowledges himself to have "reflected that the number of witnesses was a strong presumption they were right, and that St. Gregory upon good works professes himself to be of the same opinion;" but little advance, however, will be made toward that degree of cultivation which insures the display of good taste so long as this principle is recognized or acted upon as it has been. Attention must be turned to this subject, as to every other, before excellence in it can be attained; and when we take into view the necessity that exists for a judicious choice of situation, a pleasing and characteristic arrangement of the grounds, and a correspondent excellence in the appearance of the mansion, no one who claims to be blessed with an ordinary share of discernment but will confess the absurdity of taking one standard upon trust for every species of locality, and every kind of aspect. Mr. Loudon holds it to be necessary that the builder of a villa "either possess taste himself, or has

sense enough to call to his assistance the taste and judgment of others who are qualified to practice this branch of the art of design," and it cannot be thought that this excellent author is at all unreasonable in the conclusion at which he has arrived.

If the builder, therefore, would have a handsome and suitable house he has had to depend very much upon his own ideas, assisted only by the information to be obtained from scarce and expensive books; but we may often observe that a diligent perusal of these is productive, in more ways than one, of very essential service to him (this necessity for individual application on the part of the proprietor). It has at least this advantage, that it continually adds to the small number of well-informed amateur architects, and will, doubtless, in time come to have some influence on the public at large. The enlightened builder sees at once that he can seldom rely upon professional aid, and he yields to the necessity of taking up the subject thoroughly for himself. If he wants a religious edifice of the Greeks, with three or four tiers of windows in the height of the columns, he gets a hash of Stuart from many a professional architect, ready cut and dried, in tetrastyle, hexastyle, prostyle or no style, and nothing more to do but to pay for it roundly; but if he will choose anything else he must generally superintend it himself. This practice will lead to a transition state: it is true, and it is not difficult to see, that we have already entered upon it; a state of domestic architecture in which the feeling and sentiment of the whole are quite correct, but which is without a corresponding excellence in the details of the various parts. In this respect it is the very antipodes of style displayed in the various public buildings of the day which have the questionable benefit of professional supervision. It will readily be owned that these errors of technical detail are slight, indeed, when compared with the total failure to appreciate the ideas of fitness and expression, even in their most obvious manifestations. In spite of them we have seen the much-abused country gentleman who had long been groping about in the primitive darkness of Ionic temples and white board fences, all at once blessed with an unmistakable glimmering of the true picturesque, doubting whether an English cottage or an adaptation of an Italian villa were not a more appropriate, as well as a more comfortable residence than his temple, and even taking up decided notions upon the subject of hedges and rustic palings. Ideas come to him rapidly upon a theory which had hitherto been in his mind an unformed void,—and he seldom drops the new discovery until he has sought out the best sources of information, and availed himself of all that he is able to apply. Nothing but individual study in each case would have produced the visible result, and it is, without doubt, to this laborious process on the part of their owners that we owe the various pretty country seats that are beginning to appear in the vicinity of Boston. . . .

Of the materials which are in the most common use, it will scarcely be necessary to speak; yet I am unwilling to forego the opportunity of advancing one or two ideas on the subject of the Quincy stone, which is so great a favorite in all the most ambitious of our public and private buildings. For warehouses, piers, fortifications, wharves, bridges, and for the foundation of other edifices, nothing could be more completely suited. Its eternal rigidity seems to bid defiance to time, and to all the accidents of war, flood and fire to which structures of the class I have enumerated are likely to be exposed. But it is totally unfitted for the graces and amenities of any more delicate forms of building. In the first place, it is of so hard and unyielding a texture that it is worked with great difficulty, and a cost, compared with that of cutting other sorts of stone, which may safely be termed enormous. If possible to bring it all into the pliant forms of decorative detail, even when thus elaborated, it would never produce the intended result. In the Gothic and Italian styles, in particular, the mouldings are often undercut, and present that infinite variety of light and shade which can only arise from the aerial tints being most carefully studied. But the more this stubborn material is hammered and brought to a surface, the stiffer becomes its effect, because the parts cut are rendered lighter, instead of darker, than the natural surface as split from the quarry, and all the intended effect of relief and shadow is thus counteracted and lost. And in the second place, the whole tone of color of this stone is so similar to the atmospheric tint, that it is utterly impossible to avoid a dull and sombre monotony of shade, which is as offensive to the eye of an artist as a continual drumming on one string of a piano would have been to the ear of Mozart. Its invariable use evinces as much knowledge of propriety in material as the stereotyped portico does of ingenuity and originality in design.

The chocolate-colored freestone of Connecticut and New Jersey is a far better and cheaper material. It is softer and darker than granite, and for beauty of color it is scarcely to be brought into comparison with its melancholy-looking rival. It is with great pleasure that I have perceived this stone to be made use of in the construction (or perhaps it would be nearer to truth to say *veneering*) of a new church in Hanover Street, in this city. Whatever the design of that building may be, its material is certainly well chosen. It has an air of shadowy repose which is the very opposite to the sulky uniformity of most of our other public buildings, in which the Quincy stone has been used. These different results are now fairly brought into contrast, and if there is any judgment left in the minds of builders, we certainly have some room to hope for the future adoption of the better and cheaper material.

In this matter, as in every other in the art, the mediæval architects are able to teach us our alphabet of taste. Too wise to waste their time and labor upon an unsuitable stone, and dissatisfied, in many instances, with that which England afforded, they crossed the British channel to the Continent, and brought the rich Caen stone from the shores of Normandy, to their workmen at Canterbury and Westminster. Communication among us is now so rapid, cheap and easy that little excuse can be conceded to us for an oversight in this important particular.

I am anxious that our architects give this point, as well as some others which I have brought forward in these lectures, a careful consideration. It is certainly agreeable to a rational being to think for himself occasionally, on the principles of common-sense. If this principle were more frequently followed, I am convinced that we should have less bad architecture to complain of than at present. The great root of the difficulty is that the professors of the art take things too much upon trust. It may be doubted whether the system of education among them is likely to diminish this easy practice. If a young man designs to enter the profession, he is placed under the care of some architect in active practice, who takes good care to take no more pupils than are necessary to perform the drudgery of the office. His period of pupilage is spent either in copying contracts and specifications, or in designs of the most common-place buildings, and in working out the details of carpentry and bricklaying. "It is not pretended that the pupil is to be instructed in the history or principles of the art, nor to be taught the means of designing buildings according to any fixed or received theory. If, during his apprenticeship, he picks up any artistic notions on the subject, he must have more enthusiasm or better opportunities than fall to the lot of his contemporaries." Pupils are taken to assist the master in carrying out his own designs, and to acquire what little knowledge may stick to them in so doing, but whatever they learn beyond that is their own.

Thus they set up, at last, on their own account, but little more than mere mechanical draughtsmen. Never do they study the spirit of the buildings of antiquity, or seek to trace the motives or feelings which sought expression in those forms, so that by following in the same path they might arrive at the same perfection. The forms and details of the Grecian orders only are at their fingers' ends, to be used over and over again, on every opportunity that occurs, and they are prepared to execute any design their patron may wish, and to do it on the shortest possible notice. And it is some question whether, if a young man on entering the profession should decide to think for himself, and to shake off the trammels of this school, when the struggle of life is just beginning with him, he would not probably starve, without having an opportunity even to try his principles, while those following in the wake of the copyists were rising in their profession and enriching themselves, without the least trouble or exertion.

But if our architects were ever so perfect — if they were all Raphaels, Bramantes, Michael Angelos, and Palladios, there is yet another danger to be encountered; I mean the interference of employers in matters which do not properly fall under their control. The design of an architect should be strictly consistent and relative in all its parts. How often this standard of excellence is really arrived at, even in the portfolio, it would perhaps be difficult to ascertain, but it is certainly incumbent on those who have the ostensible direction of his movements, if they cannot assist him, at least to refrain from tying his hands. It is not to be supposed that they are qualified to take the direction of what they never learned, or of which they have, at best, but a very imperfect idea. General instructions, therefore, in the outset, are all that should ever be issued. A statement of the intended form and extent of the edifice, of the style preferred, and, above all, of the limit of expense, are instructions enough; the architect then goes properly and safely to work, and can easily bring his project within the limit which is prescribed. But when his drawings are completed, he should never submit to have them pared down or altered by an ambitious, a whimsical, or a penurious committee of taste. I have known an instance where, after a Grecian design had been procured from an architect, one of the committee men peremptorily insisted on the introduction of what he called "pinted winders," giving it distinctly to be understood that he had quite made up his mind to that item, at least, and that he had come into the commission with a full determination to use his whole influence in favor of what he esteemed the handsomest form a window could be made to assume. The entablature of the Ionic portico was accordingly divided over the central intercolumn, the pillars were set back and engaged in the wall, and a huge equilateral arched Gothic window filled up the whole centre of the front, rose through the gap which had been formed in the horizontal entablature, and finished in a point under the apex of the pediment above it. The church where this was done is now to be seen within twenty miles of Boston.

This is only one of the absurdities which are introduced by ignorance in authority. The architect who has a real interest in his profession, and who does not follow it only for the income it affords, should prepare himself to encounter these difficulties, and endeavor by persuasion and argument to remove them. It is only by taking this high stand that he can aid in establishing the dignity of the body to which he belongs. But if he fail of success in his attempts to convince, and finds that he is to be overruled in essential points, he is bound, in honor and conscience, to withdraw. . . .

I hope these observations will be received with as much frankness as they are given. "When the fine arts exert a really profitable

influence, they act by increasing those sources of reasonable pleasure by which the mind is neither degraded, enfeebled nor depraved. That a love for them, and for architecture in particular, may be made to produce a most beneficial effect cannot be doubted, for there can be no greater source of good to the community than the multiplication of such refined gratifications. But when the fine arts are allowed in any manner to become the subject of contention, then the honor which they possess is lost. The productions of Phidias or of Raphael, it has been well observed, become despicable if they tend to increase the causes of difference between those who ought to work together for the promotion of the arts. We are already furnished with too many unfortunate causes of opposition arising out of more important matters. Whether this difference might not be easily diminished by a mutual agreement upon the great principles which ought to be universally recognized, it is no part of the present object to inquire; but at all events, to use the words of an eminent critic, "let us avoid imitating children," — let us not quarrel about our mere playthings and toys.

The influence of the public taste upon architecture is too clear and obvious to admit of doubt, and whenever the means of patronage in the hands of the public shall be accompanied with that true knowledge so necessary to *give value* to patronage, who can deny that the works of our architects will rise to a level which they ought long ago to have attained. Accomplish this object, and we may look forward with confidence to a brighter period in the history of American architecture.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

AT the meeting of the Society, September 19, 1883, a discussion by Mr. CharlesDouglas Fox, of London, Corresponding Member of the Society, "On the Increased Efficiency of Railways," was read by the Secretary.

Mr. Fox referred to the fact that English railway managers and engineers have long realized the great importance and economy of a thoroughly substantial road-bed. The formation widths on their chief railways are now made thirty feet, both in cuttings and on embankments for the double lines, and very great care is taken to thoroughly drain this formation in cuttings by deep ditches on each side, with earthenware drain-pipes in them, and filled in with broken stone or other dry material. The ballast, consisting of broken stone, clean gravel, coarse sand, burnt clay or ashes, is not allowed to be less than one foot in thickness below the bottom of the tie. For lines of constant and heavy traffic, the bull-head grade, double-headed rail, having a large top member for wear, and a very small bottom member, is found to be the best section for steel rails. The weight of these rails is eighty-four pounds per yard. The chairs are from forty to forty-six pounds each and the rails are secured in them by keys of compressed oak. The tendency of the English companies is to expedite traffic, both passenger and goods, not by higher rates of speed, but by reducing the number of stoppages. The traffic lines are gradually quadruplicating their tracks, — in some cases throughout, — in others by sidings several miles in length. There is a very general feeling in favor of identifying the driver with his engine, and holding him responsible for its working. On some lines the name of the driver is conspicuously attached to the engine. Mr. Fox forwarded also the railway regulations of the English Board of Trade, which give very minute directions in reference to the construction and running of railways.

A paper by Mr. Wm. Howard White, M. Am. Soc. C. E., was also read, upon the subject of "Railroad Bridge Floors." Mr. White advocates inside guard-rails for the purpose of preventing, as far as possible, serious results from the derailment of wheels.

His reasons for advocating the inside guard-rails are: that he considers them more efficient for the same height above the tie than the outside guard; that they can be placed so as to hold the wheel nearer the rail, particularly when the use of the snow-plow is considered; that they can be more strongly secured at the ends for the purpose of drawing derailed wheels towards the rail, or to secure the ditching of a car which has gone too far to be safely drawn back; that they are more economical. He considers that the ties should have five inches of clear distance between them.

The papers were discussed by Messrs. Wm. H. Paine, Cooper, Blunden and Bogart.

At the meeting held October 3, 1883, a paper by Mr. James Christie, M. Am. Soc. C. E., on Experiments on the Strength of Wrought-Iron Struts, was read by the Secretary in the absence of the author. These experiments were made at the Pencoyd Iron Works for the purpose of determining the comparative resistances to compression of long and short struts of rolled angles, tees, beams and channel-sections. The specimens were tested by four different methods, viz.: with flat ends between parallel plates to which the specimen was in no way connected; with fixed ends or ends rigidly clamped to parallel plates, the plates substantially forming flanges to the specimen; with hinged ends, or both ends fitted to hemispherical balls and sockets or cylindrical pins; with round ends, or both ends fitted to balls resting on flat plates. The specimens varied in length from six inches up to sixteen feet, and were selected to obtain a uniform character of material. The paper gave tabulated results of two hundred and ninety-nine experiments, and these results were illustrated by a number of diagrams. There were also results given of a number of tests of welded tubes. The general conclusions drawn from these experiments were as follows ($\frac{l}{r}$ being length divided by least radius of gyration): —

When struts are short, say $\frac{l}{r}$ below 20, there will be no practical difference in the strength of the four classes, so long as reasonable care is taken to keep the centre of pressure in the centre of the strut. Hinge-ended struts vary all the way from round-ended up to flat-ended in strength. If the hinges are pins of substantial diameter, well fitted, and exactly coincident with the axis of greatest resistance of the strut, the strength of the strut will be fully equal to that of a flat-ended, but considering the impracticability of maintaining this rigid accuracy, the average hinged struts as compared with flat-ended will fall in strength as the length is increased, until $\frac{l}{r}$ is about 250, when they will average one-third less resistance than flat-ended; from this point they will gain comparatively until $\frac{l}{r}$ becomes about 500, when both classes will be practically equal. Fixed-ended struts gain in comparative resistance from the shortest lengths upwards until $\frac{l}{r}$ becomes about 500, when they are twice as strong as either the flat or hinge ended.

Round-ended struts continually lose in comparative resistance as the length is increased. When $\frac{l}{r}$ is about 340 they will be half as strong as hinge-ended, and when $\frac{l}{r}$ is about 160 they will have only half the strength of flat-ended.

The iron from which the tests were made exhibited the following resistances to direct compression, being the general results of several tests of small section, fifteen inches long, and secured in such a manner as to prevent lateral flexure.

With 30,000 pounds pressure per square inch incipient, permanent reduction of length was observed.

With 35,000 pounds pressure per square inch, failure of elasticity occurred, and marked permanent reduction of length.

With 50,000 pounds per square inch, a permanent reduction of length of three per cent occurred.

With 75,000 pounds a permanent reduction of ten per cent, and with 100,000 pounds pressure per square inch, a permanent reduction of twenty-eight per cent of the length.

The paper was discussed by Messrs. Theodore Cooper and Charles E. Emery, who both expressed the opinion that these experiments were of very great value, being made with material of uniform character, and in such a way that comparisons could be made directly between the different methods adopted in testing.

SANITARY PLUMBING.[1] — VI.

THE PLUNGER-CLOSET.

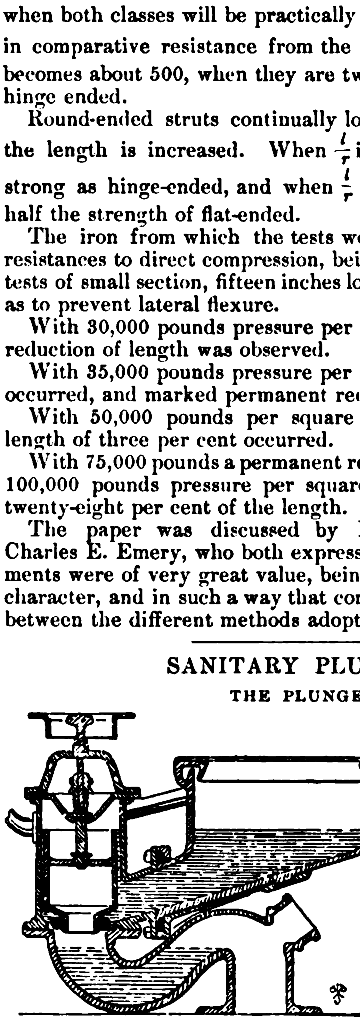

Fig. 5. — Plunger-Closet.

PLUNGER - CLOSETS are those which have the outlet closed by a plunger or plug fitting over or into it, and held in place by its own weight.

Figure 5 represents a plunger-closet having a simple hollow plunger, the overflow being through the plunger itself. This is the simplest form of plunger-closet; but it allows effluvium from matters which may be left floating in the trap to escape into the room through the plunger and around its handle.

Figures 6 and 7 represent a plunger-closet having its overflow trapped with a plunger or valve. This is the only plunger-closet except the Jennings which has a mechanical seal for the overflow, and the only closet in which the overflow-seal cannot be destroyed by siphonage. The complication arising from the mechanical trapping of the overflow and the enormous size of the receiver form serious objections to this form of closet. Were there no better mode of preventing the action of siphoning, however, it would stand high in spite of the inherent defects of its class.

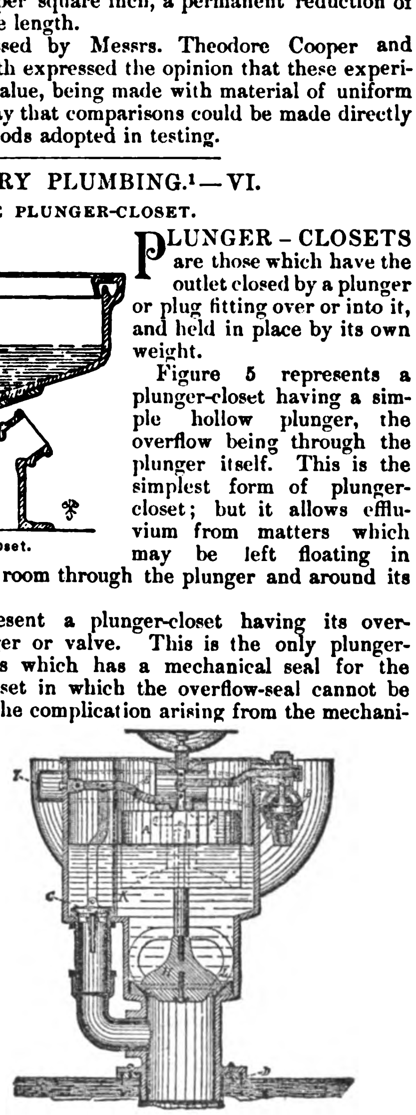

Fig. 6. — Plunger-Closet with Plunger in Overflow.

Figure 8 represents the class of plunger-closets which has a chamber or cistern for the supply-cock and regulating float connected with the plunger-chamber. This form of closet is very objectionable. The float-chamber becomes foul like the plunger-chamber, and the two chambers

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[1] Continued from page 174, No. 407.

together then form a species of cesspool nearly as bad as that of the pan-closet. The above may be considered as types of all known plunger-closets. Some plunger-closets are made without water-traps under the plunger, but these, like the trapless valve-closets, are totally unreliable. In regard to the flushing, we find here a much larger extent of surface of receiver which never receives a scouring of water than in the valve-closet. The flushing stream passes *under* the plunger-receiver, and not *through* it as it does through the valve-receiver. The plunger-receiver must also from its nature be larger than that which is sufficient for the valve. These two circumstances render it much more easily fouled.

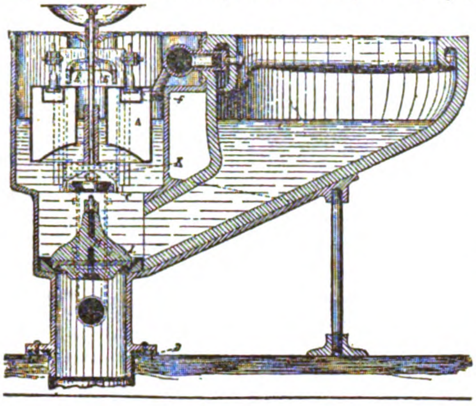
Fig 7. — Plunger-Closet with Plunger in Overflow.

To operate the machinery of a plunger-closet requires still more of an effort than is the case with the valve, because the dead weight of the plunger has to be lifted direct without the aid of the leverage of the crank which is employed with the valve. The weight of the plunger must be sufficient to retain the water in the bowl by its pressure against its seat.

In all other respects the flushing of the plunger-closet is attended with precisely the same defects as that of the valve-closet.

The same criticisms applicable to the valve-closet in relation to its form, material, construction and cost, apply with equal force to the plunger-closet, and the same deductions may be made in its comparison with the common pan-closet; *i. e.*, it is superior to the *ordinary* pan-closet, but greatly inferior to its most improved form, with enamelled, scoured, and ventilated receiver, and improved and solid construction, and, in general, it is inferior to the pan-closet in the principle of its construction and operation.

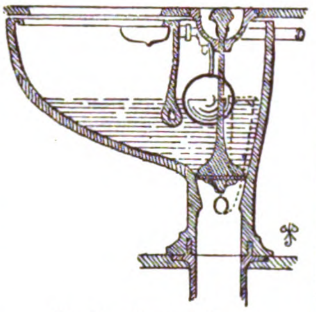
Fig. 8. — Plunger-Closet.

ROMANESQUE ARCHITECTURE.

MINNEAPOLIS, MINN., October 3, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Is there any book (or set of photographs) published on "Romanesque Architecture;" if so, where can it be procured?

Yours respectfully, A. B. C.

[THE standard book on Romanesque architecture is Revoil's *Architecture Romane*, which can be obtained through Messrs. J. Sabin & Sons, Nassau St., New York, for about $50. Viollet-le-Duc's *Dictionnaire Raisonnée* contains also an immense amount of information and detail relating to the same subject. Photographs of Romanesque work are not easily procured. A. Lévy, Astor Place, New York, publishes a very good collection, and some interesting examples can be procured of the Soule Photographic Company, Washington St., Boston. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

WESTMINSTER ROMAN CATHOLIC CATHEDRAL. — The designs for the proposed Roman Catholic Cathedral at Westminster are those of the Votive Church at Vienna, purchased by Sir Tatton Sykes from Herr Foerstel, the famous Gothic architect of Vienna who has just died. His son, also an architect, was to have come to London to superintend the building of the cathedral, and to give designs for the Archbishop's house and other buildings, but in consequence of the death of his father he has been unable to undertake the work. Sir Tatton will now have to choose another architect. The builder of the Votive Church was an ardent disciple of the famous Pugin, and his son, Peter Paul Pugin, will probably be the architect selected.

ART EDUCATION IN GERMANY. — With regard to art education in Germany the kingdom of Wurtemburg may be instanced to show the high regard in which art and science are held, and the great efforts which are made in order that all classes of the people may be benefited. In Stuttgart there is a central establishment with a museum of art and industry and a manufactory of models and copies of works of art, having schools for drawing, modelling and designing carried on under the same roof. Then, too, in provincial towns schools are established having a direct influence upon the trade of the place, as at Reuttingen, where there is a weaving school of European celebrity; Rottenburg, where there is one for wood-carving, and Gmund, where a teacher of chasing and engraving on metal gives instruction in the artistic branches of their trades to the boys engaged in the extensive brass, gold, silver and jewelry manufactories of that place. Here the boys are taught to apply the principles learned in the schools to the particular branch of the trade in which they are engaged. There are 220 pupils attending the art school, 115 of whom are already in trade. — *N. Y. Mail and Express.*

A SALT PIPE-LINE. — A number of Philadelphia and Boston capitalists have formed an organization which has in view the laying of a pipe-line from the new salt wells in Western New York to some point in the Lehigh coal region. The consumption of coal in the evaporation of brine at the wells is very considerable, and the projectors of the pipe-line aver that the waste coal, or culm, that has accumulated in the coal regions, and cannot be utilized by any industry there, could be used to advantage in the evaporation of brine. The Lehigh Valley Company have offered ground for the erection of mammoth salt works, accepting the removal of the great piles of culm, which have become detrimental to the workings of the coal business in that region, as a sufficient remuneration. The line, if laid, will be two hundred miles in length. The plan is not deemed practicable by salt men at the wells, but if it should prove successful the parties interested would secure a monopoly of the salt trade, for no works having to buy and transport coal could begin to compete with them in the manufacture. Experienced salt men say that the brine running through the pipes would be thick with iron rust when it reached the works, and, unless some chemical action could be brought to bear on it to purify it, would be worthless. It is also estimated that the two hundred miles of pipe would cost $1,400,000, and that the interest on this investment would more than pay for the coal and the transportation of it from the coal fields to the salt wells. — *Iron Age.*

ZAPFLE'S FIRE-EXTINGUISHING LIQUID. — Several experiments were carried out yesterday on the Crown lands in Whitehull Place, with a view of showing the efficacy of Zapfle's patent fire preventive and extinguishing liquid. In the first experiment eighteen barrels filled with shavings saturated with tar and petroleum were set alight, and the fire having been allowed to obtain a fair hold, two of Zapfle's hand-pumps charged with the liquid were set at work and speedily extinguished it. It was stated that the quantity of liquid used was exactly twenty-five quarts, the proportion of water mixed with the patent liquid being as four to one. A wooden hut prepared with the fluid, filled with shavings and fagots impregnated with petroleum, formed the subject of the next experiment. The shavings and fagots were set fire to, and after the conflagration had been extinguished the hut was found charred but intact. A quantity of petroleum was subsequently thrown on it and allowed to burn out: and save that the wood-work was a little more charred there was no alteration in its appearance. The contention of the patentee is that, however severely wood prepared with the fluid may be charred in a fire it cannot burst out into a flame. Another hut, not prepared with the liquid, filled with shavings and fagots saturated with tar and petroleum, was afterward set alight. Having been allowed to burn for about a minute, it was extinguished within the same time, one of the pumps doing the principal work, although three were in use for a few seconds. A muslin dress, which had been washed in a mixture of water and the patent fluid, was next experimented on. Several attempts to set it alight failed, though it was charred completely through. The same experiment was afterward performed on a muslin curtain and a piece of canvas, intended to represent theatre scenery, and was attended with similar results. It is said that the invention has been adopted by the French Government for the naval, military, and other departments. — *London Times.*

TESTS OF THE QUALITY OF SOIL WATER. — The Secretary of the State Board of Health of Michigan reports the following: The question of the fitness or unfitness of soil water for domestic use can be absolutely determined only by a careful chemical analysis. But many persons who would not wish to incur the trouble and expense of a chemical analysis will yet desire some popular means of testing the water they use. The following methods of testing such water are presented, not as the most complete possible, but such as any one can supply without the skill and appliances of the practical chemist. If such tests cast suspicion upon the quality of the water, and especially if the water appears to cause sickness in any one using it, the water should be changed, or else a careful analysis should be made by some competent chemist.

Color. — Fill a bottle made of colorless glass with the water; look through the water at some black object; the water should appear perfectly colorless and free from suspended matter. A muddy or turbid appearance indicates the presence of soluble, organic matter, or of solid matter in suspension. It should be as "clear as crystal."

Odor. — Empty out some of the water, leaving the bottle half full; cork up the bottle and place it for a few hours in a warm place; shake up the water, remove the cork and critically smell the air contained in the bottle. If it has any smell, and especially if the odor is in the least repulsive, the water should be rejected for domestic use. By heating the water to boiling an odor is evolved sometimes that otherwise does not appear.

Taste. — Water fresh from the well is usually tasteless, even though it may contain a large amount of putrescible organic matter. Water for domestic use should be perfectly tasteless, and remain so, even after it has been warmed, since warming often develops a taste in water which is tasteless when cold. If the water, at any time, has a repulsive or even disagreeable taste, it should be rejected.

Heisch's Test for Sewage Contamination. — The delicacy of the sense of smell or taste vary greatly in different individuals; one person may fail to detect the foul contamination of a given water, which would be very evident to a person of a finer organization. But if the cause of a bad smell, or taste, exist in the water, the injurious effect on health will remain the same whether recognized or not. Moreover, some water of very dangerous quality will fail to give any indication by smell or taste. For these reasons I attach especial importance to Heisch's test for sewage contamination or the presence of putrescible organic matter. The test is so simple that any one can use it. Fill a clean pint bottle three-fourths full of the water to be tested, and dissolve in the water a teaspoonful of the purest sugar — loaf or granulated sugar will answer — cork the bottle and place it in a warm place for two days. If in twenty-four to forty-eight hours the water becomes cloudy or muddy it is unfit for domestic use. If it remains perfectly clear it is probably safe to use.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

286,176. Fireplace Grate. — Albert Chase, Boston, Mass.

286,224. Fastener for the Meeting-Rails of Sashes. — George W. Reeve, Millburn, N. J.

286,234. Lumber-Drier. — John Owen Smith, Jamison, Ala.

286,250. Reversible Store-Door Latch. — August Arens, New Britain, Conn.

286,255. Roofing-Paint. — Mead Blake, Compton, Quebec, Can.

286,270. Overflow Connection for Bath-Tubs. — Allen P. Creque, New York, N. Y.

286,306. Fire-Escape. — Andrew J. Johnson, Cuyahoga Falls, Ohio.

286,321. Pavement and Floor. — Elijah B. Martindale, Indianapolis, Ind.

286,330. Process of converting Cast-Iron into Fibrous Wrought-Iron. — Jacob Resse, Pittsburgh, Pa.

286,345. Vise. — George Thorp, South Bay City, Mich.

286,365. Spring-Compression Faucet. — Joseph Zane, Boston, Mass.

286,376. Clamp and Vise. — Charles L. Bellamy, Arlington, N. J.

286,385. Adjustable Drawing-Knife. — John S. Cantelo, Taunton, Mass.

286,388. Ratchet Bit-Brace. — Wm. R. Clarkson, Buffalo, N. Y.

286,393. Fire-Alarm. — Frederick A. Copeland, La Crosse, Wis.

286,401. Fire-proof Building. — William H. Dolman, St. Helen, Oreg.

286,405. Paint-Brush Holder. — Albert T. Edwards, South Kingston, R. I.

286,431. Imitation Stained-Glass. — F. Benedict Herzog, New York, N. Y.

286,456. Fire-Escape. — Thos. Macdonough, Benton, Cheboygan County, Mich.

286,502. Fire-Extinguisher. — Pierre C. E. Tabouet, Paris, France.

286,519. Fire-Escape. — John Zerr, Keokuk, Iowa.

286,523. Fire-Escape. — Charles Bemis, Ludington, Mich.

286,539. Door-Hanger. — George W. Hey, Syracuse, N. Y.

286,542. Illuminating Vault-Covers or Grating-Tiles and Surfaces made of the same. — Thaddeus Hyatt, New York, N. Y.

286,513. Wrench. — Andrew Hyde, Hatfield, Mass.

287,552. Lumber-Drier. — David F. Noyes, Lewiston, Me.

286,555. Ventilating-Screen for Windows. — Emmeline W. Philbrook, Boston, Mass.

286,558. Skylight. — John C. Ryan, Detroit, Mich.

286,559. Sash-Holder. — Edson E. Shepard, Watertown, N. Y.

286,561. Wrench. — Willard N. Smith and Herbert M. Vincent, New Bedford, Mass.

10,391 (*Reissue*). Steam-Heater. — William B. Dunning, Geneva, N. Y.

SUMMARY OF THE WEEK.

Atlanta, Ga.

Armory. — Gate City Guards, Peachtree St., brick, 50′ x 120′; cost, $15,000; Bruce & Morgan, architects.

Bank. — Gate City National Bank, Alabama St., brick and stone, with terra-cotta finish, in the Queen Anne style; cost, $100,000; Humphries & Norman, architects.

Churches. — Unitarian chapel, Church St., half-timber; cost, $3,500; Humphries & Norman, architects.

Additions to St. Luke's Cathedral, Peachtree St.; cost, $3,400; Humphries & Norman, architects.

Trinity Mission (Methodist), frame, Boulevard; cost, $3,500; Bruce & Morgan, architects.

Zion (M. E.) Church (colored), brick, Clark St.; cost, $12,000; Bruce & Morgan, architects.

Factory. — The Swift Specific Co., cor. Hunter and Butler Sts., three-st'y brick factory, 75′ x 150′; cost, $16,000; E. G. Lind, architect.

Hotel. — Hayden House, Marietta St., three-st'y brick, 42′ x 90′; cost, $11,000; Fay & Eichberg, architects.

Office-Building. — Maj. J. A. Fitten, cor. Marietta and Broad Sts., five-st'y brick and iron office-building, 50′ x 80′; cost, $30,000; Bruce & Morgan, architects.

Pavilion. — Gate City Street Railway, Ponce de Leon Springs, frame; cost, $3,500; Humphries & Norman, architects.

School-Houses. — City of Atlanta, Calhoun St., two-st'y brick school-house, 60′ x 85′; cost, $10,000; Fay & Eichberg, architects.

"West End Academy," frame; cost, $5,000; Humphries & Norman, architects.

State Capitol. — Following the action of the Legislature, recently adjourned, Gov. McDaniel has appointed a commission, which met October 4 and 5. It was decided to erect the State capitol on the very eligible site bounded by Washington, McDonough, Hunter and Mitchell Streets, recently donated for that purpose by the City of Atlanta. In order to obtain plans and proceed to the erection of the building as soon as possible, the commission concluded to offer $3,500 for the most acceptable design, with full specifications, for a State capitol, to cost not exceeding $800,000, reserving the right to reject any or all designs, and to advertise in many of the leading journals of the country. Designs to be drawn to one-eighth scale, and to be received not later than December 19.

Stores. — Boynton Bros., Alabama St., two-and-a-half-st'y brick store; cost, $18,000; Gust. E. Leo, architect.

M. C. Keiser, Pryor St., three-st'y brick store; cost, $12,000; Bruce & Morgan, architects.

Lovejoy & Thompson, Broad St., two-st'y brick store, 25′ x 100′; cost, $6,000; Bruce & Morgan, architects.

R. W. Smith, Whitehall St., brick addition, 45′ x 70′; cost, $5,000; E. G. Lind, architect.

J. High, Whitehall St., alteration of front, iron and brick; cost, $4,000: Humphries & Norman, architects.

Dwellings. — E. C. Peters, Ponce de Leon Ave., two-st'y brick dwell.; cost, $12,000; Humphries & Norman, architects.

W. R. Hill & A. G. Greer, Church St., brick tenement, 50′ x 80′; cost, $7,000; Bruce & Morgan, architects.

Mrs. Esther Hymes, Forsyth St., three-st'y brick dwell.; cost, $4,500; Gust. E. Leo, architect.

Dickson, Peachtree St., brick and frame dwell.; cost, $7,000; Wm. H. Wood, architect, New York; Humphries & Norman, Superintendents.

Jas. M. Couper, Ponce de Leon Ave., two-st'y frame dwell.; cost, $12,000; Fay & Eichberg, architects.

Gate City Street Railway, Boulevard. 2 two-st'y frame tenements; cost, $8,000; Bruce & Morgan, architects.

W. G. Herndon, Spring St., 3 two-st'y frame tenements; cost, $8,000; Bruce & Morgan, architects.

Hoke Smith, West Peachtree St., two-st'y frame dwell.; cost, $6,000; Fay & Eichberg, architects.

L. B. Nelson, Boulevard, frame dwell.; cost, $8,000; Bruce & Morgan, architects.

W. P. Patillo, cor. Fair and Crew Sts., frame addition; cost, $8,500; E. G. Lind, architect.

Jno. A. Colvin, Washington St., two-st'y frame dwell.; cost, $4,000; Fay & Eichberg, architects.

H. Crankshaw, Nelson St., frame dwell.; cost, $4,000; Humphries & Norman, architects.

R. B. Toy, Forest Ave., two-st'y frame dwell.; cost, $3,500; Fay & Eichberg, architects.

Dr. E. W. Roach, McDonough St., frame dwell.; cost, $3,500; Humphries & Norman, architects.

Prof. H. Bumstead, Atlanta University, frame dwell.; cost, $3,000; Humphries & Norman, architects.

Jno. A. Stevens, Cane St., two-st'y frame dwell.; cost, $2,500; Fay & Eichberg, architects.

Baltimore.

Building Permits. — Since our last report twenty-one permits have been granted, the more important of which are the following: —

Franz W. Knoch, two-st'y brick building, w s Towson St., s of Nicholson St.

J. B. N. Berry, three-st'y brick building, (square) e s McColloh St., bet. Wilson and McMechen St.

Wm. H. Fields, two-st'y brick building, s w cor. Paca and St. Peters Sts.

M. I. Davis, four-st'y brick back building, to No. 89 e s North St., bet. Saratoga and Pleasant Sts.

P. J. King, two-st'y brick stable, e s Hair St., s of Hudson St.

C. C. Rumpf & Co., two-st'y brick stable, s s Dover St., bet. Green and Emory Sts.

Jos. Scherer, two-st'y brick stable, rear of 133 w s Broadway, bet. Eastern Ave. and Bank St.

Alteration. — E. G. Perine, Esq., is making alterations to the building 56 South Gay St., to cost $2,500; from designs by George Archer, architect; Wm. H. McDonnal, builder.

Boston.

Building Permits. — *Brick.* — *Vale St., Nos.* 43 *and* 45, Ward 21, for Dennison Manufacturing Co., manufactory, 42′ x 80′, three-st'y flat; D. H. Jacobs & Son, builders.

Parker St., cor. Centre St., Ward 22, for Owen Nawn, 2 dwells. and store, 27′ 6″ x 50′ each, three-st'y flat.

Monument St., cor. Medford St., Ward 3, for Howard Bros. & Co., mill, 48′ x 100′; five-st'y flat; ell, 23′ x 109′; L. Greely, builder.

Court St., Nos. 46 *and* 48, cor. Tremont St., Nos. 2–16, Ward 10, Augustus Hemmenway Estate, mercantile, 49′ and 58′ x 100′, seven-st'y flat; T. J. Whidden & Co., builders.

Camden St., near Huntington Ave., Ward 22, for Metropolitan R. R. Co., stable, car-house and shop, 160′ and 216′ x 237′, one-st'y flat; material, iron; John Quirk, builder.

Commonwealth Ave., Nos. 176 *and* 178, Ward 11, Wm. P. Wesselhoeft, dwell., 28′ x 47′, three-st'y mansard; Morton & Chesley, builders.

Commonwealth Ave., No. 178, Ward 11, for James B. Bell, dwell., 28′ x 47′, three-st'y mansard; Morton & Chesley, builders.

South St., near Pleasant St., Ward 24, for Boston Gas Light Co., boiler and pump-house, 43′ 6″ x 69′, one-st'y pitch; Wm. M. Rumery, builder.

Bicknall Ave., from Roxbury St., Ward 19, for Andreas Blume, 2 dwells., 32′ x 38′, three-st'y flat; O. Fifield, builder.

Thomas Park, Nos. 41 *and* 42, Ward 14, for Henry B. Stratton, 2 dwells., 20′ x 33′, three-st'y flat; Henry B. Stratton, builder.

Wood. — *Cambridge St.*, rear, near North Howard St., Ward 25, for N. & G. D. Chamberlain, 2 dwells., 15′ x 20′, two-st'y flat; Otis Wheeler, builder.

Crawford St., near Glen Hill Ave., Ward 21, for Mrs. E. D. Mallory, dwell., 36′ 6″ x 47′, two-st'y pitch; Spinney & Haddock, builders.

Waumbeck St., near Warren St., Ward 21, for Neil McNeil, dwell., 26′ x 41′, two-st'y pitch; McNeil Bros., builders.

Crosby St., near Washington St., Ward 23, for Patrick Crosby, dwell., 21′ x 31′, two-st'y pitch; John Gately, builder.

Sumner St., near Bremen St., Ward 2, for Daniel V. Fotts, store, 18′ x 30′, one-st'y flat; S. Y. Chase, builder.

Dorchester Ave., cor. Hyde St., Ward 15, for John Nolan, dwell. and store, 27′ x 35′, three-st'y flat; Richard Ramsell, builder.

Lewis St., Nos. 62 *and* 64, cor. Marginal St., Ward 2, for Mrs. Rosanna M. McDevitt, dwell. and store, 25′ x 35′, two-st'y flat; John F. Slattery, builder.

Dorchester Ave., Nos 814 *and* 816, Ward 15, for Joel W. Tuttle, 2 dwells., 14′ 6″ x 19′ 6″ and 22′ x 33′, two-st'y mansard; P. P. Nichols, builder.

Centre St., near Orchard St., Ward 23, for Martin Downey, 2 dwells., 12′ 3″ x 16′ 6″ and 19′ 6″ x 28′, two-st'y pitch.

Hyde Park Ave., near Walk Hill St., Ward 23, for Richard E. Cochran, 2 dwells., 20′ and 26′ x 36′, two-st'y pitch; Richard E. Cochran, builder.

Greenwich Pl., near Fenton Pl., Ward 24, for Adomiram Burrell, 2 dwells., 23′ x 36′, two-st'y flat; Wm. J. Jobling, builder.

Call St., cor. Child St., Ward 23, for Mrs. Winifred Smith, dwell., 24′ x 32′, two-st'y mansard; John O'Keefe, builder.

Allan St., near Ashmont St., Ward 24, for Sarah E. W. Smith, dwell., 30′ x 30′, two-st'y pitch; J. F. Haines, builder.

Savin Hill Ave., cor. Sagamore St., Ward 24, for Daniel Cronin, dwell., 26′ x 36′ 6′, two-st'y pitch; Wm. J. Jobling, builder.

Dorchester Ave., near Commercial St., Ward 24, for Michael Cunningham, blacksmith-shop, 20′ x 50′, one-st'y flat; Alfred Ford, builder.

Washington St., near School St., Ward 23, for Joseph Emhoff, dwell. and store, 29′ x 48′, three-st'y flat; Gottlieb Merz, builder.

Dudley St., near Washington St., Ward 23, for Edward D. Jones, dwell., 15′ x 19′ and 21′ x 22′, one-st'y mansard; Edward D. Jones, builder.

Stanwood Ave., rear, near Columbia St., Ward 24, for Alexander H. Clapp, stable, 16′ x 30′, one-st'y pitch; Addington Noble, builder.

Parkman St., No. 37. Ward 24, for Davies Eddy, dwell., 26′ x 29′, two-st'y pitch; Studley Bros., builders.

Unnamed St., near Ashland St., Ward 24, for A. W. Wright, 4 dwells., 25′ x 36′, two-st'y pitch: J. E. Currier, builder.

Baxter Sq., No, 15, for Wm. R. Cavanagh, stable, 20′ x 40′, one-st'y pitch; Wm. R. Cavanagh, builder.

Marginal St., rear, near Orleans St., Ward 2, for Eastern R. R. Co., storage of coal, 16′ x 100′, one-st'y flat; H. Bissell, builder.

Linden St., near Pratt St., Ward 25, for Lebanon Pratt, 2 dwells., 14′ x 23′ and 20′ x 32, two-st'y pitch; Wm. B. Cameron, builder.

Brooklyn.

Building Permits. — *Willoughby Ave.*, s s, 138′ w Marcy Ave., 2 three-st'y brownstone dwells., tin roofs; cost, $6,000; owner and carpenter, Samuel Peden, Jr., 399 Marcy Ave.

Thirteenth St., s s, 387′ e Third Ave., three-st'y frame tenement; tin roof; cost, $3,000; owner and builder, S. B. Oulton, 108 Boerum Pl.; architect, Arthur Stever.

North Second St., Nos. 425, 427 *and* 429, n s, 100′ w Ewen St., 3 two-st'y frame dwells., tin roofs; cost, each, $2,000; owner, William Ward, 243 North Second St.; architect, O. H. Doolittle; builders, Sammis & Bedford.

Elizabeth St., n e cor. Dwight St., three-st'y brick hotel and store, gravel roof; cost, $8,555; owner, C. Cohn; builder, E. W. Detlefsen.

Ninth St., s e cor. Seventh Ave., 6 three-st'y and basement brownstone dwells., tin roofs; cost, each, $8,000; owner, Charles Long, 367 Seventh St.; builder, J. T. Wood.

Third Ave., s e cor. Forty-sixth St., 2 three-st'y frame dwells., tin roof; cost, each, $2,000; owner, James Tibball, Thirty-eighth St., between Fourth and Fifth Aves.; architect, L. B. Bogart; builders, R. Whelan and James Tibball.

Evergreen Ave., No. 144, s w cor. Jefferson St., three-st'y frame store and tenement, tin roof; cost, about $5,000; owner, Edward H. E. Eickson, 88 Jefferson St.; architect, J. S. Wightman.

Seventeenth St., s s, 165′ w Fifth Ave., two-st'y brownstone dwell., tin roof; cost, $5,000; owner, Thomas Word, Eighteenth St., near Fifth Ave.; architect, Thomas Corrigan; builders, Wm. and Thos. Corrigan.

Third Ave. s e cor. Thirty-ninth St., three-st'y frame store and tenement, tin roof; cost, $3,500; owner, Mary Cronin, 1009 Third Ave.; architect, H. J. Skinner.

Pearl St., n e cor. Concord St., four-st'y brick store and tenement, tin roof; cost, $11,000; owners, S. & J. C. Burling; architect, I. D. Reynolds.

Lynch St., s s, 356′ e Harrison Ave., 3 three-st'y frame double tenements, tin roofs; cost, each, $4,500; owner, L. Bossert, 648 Union Ave.; architect, J. Platte; builder, J. Auer.

Jackson Pl., w s, 80′ s Sixteenth St., 6 two-st'y frame dwells., tin roofs; cost, each, $900; owner and architect, B. Banks, 227 Eighteenth St.; builders, T. Reese and T. Crocker.

Elm St., s s, 100′ e Central Ave., 4 three-st'y frame double tenements, tin roofs; cost, each, $3,600; owner, Aug. Marschal, 145 Fulton St., New York City; architect, G. Hillenbrand.

Quincy St., No. 796, s s, 100′ w Patchen Ave., two-st'y brownstone front dwell., tin roof; cost, $4,800; owner, J. W. Robbins, 794 Quincy St.; architect, W. H. Baker; builders, N. Wood and E. T. Baker.

Maujer St., n s, 524′ e Waterbury St., one-st'y brick factory, gravel roof; cost, $8,000; owner, Wm. Brookfield, 516 Madison Ave., New York City; builder, J. Bisson.

Seventh Ave., s w cor. Carroll St., brick dwell., three stories front and two stories on rear; cost, $15,000; owner, W. E. Scovil, 255 Sixth Ave.; architect, H. J. Farquhar; builders, E. T. Rutan and —— Sims.

Foot of North Eleventh St., 250′ w First St., two-st'y brick shop, gravel and felt roof; cost, $13,000; owner, Pratt Manufacturing Co., foot of North Twelfth St.; architect, F. L. R. Sweet; builders, J. Rooney and J. Fallon.

Rodney St., No. 156, s s, 95′ from Lee Ave., three-st'y brick dwell., tin roof; cost, $4,000; owner, Jno. E. James, 107 South Fourth St.; architect, W. E. Grassau; builders, T. Winslow and Langer Bros.

Madison St., n s, 354′ w Marcy Ave., 4 three-st'y brownstone front dwells., tin roofs; cost, each, $5,500; owner and builder, Joseph I. Kirby, 73 Gates Ave.; architect, A. Hill.

North Henry St., Nos. 12 *and* 14, e s, about s Herbert St., 2 three-st'y frame double tenements, tin roofs; cost, each, $3,500; owners, F. Lange and Louisa Lither, on premises; architect, E. Schrumpf; builder, Jacob Schoch.

Third Ave., e s, 60′ s Twentieth St., 5 three-st'y frame tenements and stores, gravel roofs; cost, each, about $3,500; owner, John McGrath, 226 — Twentieth St.; architect, W. H. Wirth.

Bainbridge St., n s, 250′ e Reid Ave., 3 two-st'y brick dwells., gravel roofs; cost, each, $3,500; owner, Kate Acor, 372 Tompkins Ave.; architect, V. Fields; builder, L. Acor.

Herkimer St., n s, 309′ 9″ e Bedford Ave., 3 three-st'y brownstone front dwells.; tin roofs; cost, each, $9,000; owner, M. E. Stafford, 835 Dean St.; architect and builder, J. Stafford, same address.

ALTERATIONS. — *Monroe St., No.* 42, two-st'y brick extension; cost, $2,000; owner, Mrs. Ada Stocker, on premises; architect, G. P. Chappell.

Lefferts Pl., No. 154, two-st'y brick extension; cost, $4,000; owner, Edward Ostram, on premises; architect and builder, F. D. Norris.

Siegel St., s s, 275′ e Bushwick Ave., three-st'y brick extension, gravel roof; cost, $9,000; owners, Wm. Wall's Sons, on premises; architect, C. L. Johnson; builders, Mauer & Lehwerer.

Chicago.

FACTORY. — Furst & Rudolph are architects for the four-st'y factory on Wells St., for Theo. A. Kochs, to cost $20,000.

FLATS. — A. Smith is architect for the flats with stores below, to be built on West Polk St., for Jno. Hoffmann, to cost $20,000.

Wm. Longhurst, architect, planned the three-st'y flats and stores on State St., for D. Harry Hammer, to cost $15,000.

John Otter, architect, has completed plans for three-st'y flats, to be built on Garfield Ave., for Andrew Almert.

Three-st'y flats and stores are to be built on Butterfield St., for J. C. Trapp, to cost $9,000; T. Karls, architect.

HOUSES. — Frommann & Jebsen, architects, have completed plans for 3 two-st'y dwells., for C. P. Buckingham on Larrabee St., to cost $15,000.

Enos Hasson will build a three-st'y dwell. and store on Twenty-first St., to cost $13,000.

Wm. Longhurst, architect, planned the 3 two-st'y dwells. on West Jackson St., to cost $9,000; owner, R. R. Williams.

Dixon & Townsend, architects, made plans for the two-st'y dwell. on Michigan Ave., for W. J. Knights, to cost $8,000.

L. J. Halberg, architect, has completed plans for Mrs. Hale's three-st'y dwell. on West Jackson St.

Cudell & Blumenthal, architects, have completed plans for 4 two-st'y dwells., to be erected on State St., to cost $15,000.

Edbrooke & Burnham, architects, have plans ready for two-st'y dwell., to be erected on West Jackson St., for J. G. Keith, to cost $9,000.

J. P. Huber, architect, made plans for three-st'y dwell., to be built for J. Kadic; cost, $10,000.

WAREHOUSE. — G. Sugg will build three-st'y warehouse on Ewing St., to cost $12,000; P. W. Ruehl is the architect.

BUILDING PERMITS. — John Wilkowski, two-st'y dwell., 225 Cleaver St.; cost, $4,000; architect, Joe Wilkowski; builder, John Wilkowski.

Rev. A. Damon, three-st'y dwell., 232–234 West Eighteenth St.; cost, $8,000; architect, John Dillinburgh; builders, Tobin & Turner.

Andrew Almert, three-st'y flats, 394 Garfield Ave.; cost, $6,500; architect, John Otter; builder, A. Almert.

J. D. Hall, two-st'y dwell., 3132 Groveland Park Ave.; cost, $3,500; architect, Jno. D. Clifford; builder, H. D. Safford.

D. Harry Hammer, three-st'y and basement store and flats, 3448–50 State St.; cost, $15,000; architect, Wm. Longhurst; builder, A. Bemont.

O. P. Buckingham, 3 two-st'y dwells., 823–827 Larrabee St.; cost, $15,000; architects, Frommann & Jebsen; builder, Chas. Thiele.

Jno. Hoffman, 5 three-st'y store and flats, 873–877 Polk St.; cost, $20,000; architect, A. Smith; builder, L. Daezling.

L. A. Babcock, two-st'y dwell., 761-763 Lake St.; cost, $4,500.

Enos Hasson, three-st'y store and dwell., 206–208 Twenty-first St.; cost, $13,000.

Patrick O'Malley, two-st'y dwell., 79 Hammond St.; cost, $4,000; architect, John Otter; builder, Chris. Luehring.

M. Haefer, three-st'y store and dwell., 646 Wells St.; cost, $10,000; architects, Cudell & Blumenthal; builders, Aug. Kenker & Co.

M. Farrant, 2 two-st'y dwells., 199-201 Mather St.; cost, $3,500.

Fries Bros., three-st'y factory, 300 North Carpenter St.; cost, $6,000; architect, H. Sierks; builder, F. Hansen.

Mrs. Hale, three-st'y dwell., 528 West Jackson St.; cost, $6,000; architect, L. J. Halberg; builder, Geo. Lehman.

W. J. Knight, two-st'y dwell., 1508 Michigan Ave.; cost, $8,000; architects, Dixon & Townsend; builder, Geo. Lehman.

R. R. Williams, 3 two-st'y dwells., 1034–1038 West Jackson St.; cost, $9,000; architect, Wm. Longhurst.

G. Sugg, three-st'y warehouse, 48–50 Ewing St.; cost, 12,000; architect, P. W. Ruehl; builders, Schwartz & Kies.

Thos. Morrissey, two-st'y dwell., 3617 Wentworth Ave.; cost, $3,000; architect, Gottig; builder, R. E. McKay.

A. B. McCourtie, three-st'y dwell., 241 Park Ave.; cost, $7,000; architects, J. M. Van Osdel & Co.; builder, Wm. Scott.

E. H. Gould, two-st'y dwell., 730 Washtenau Ave.; cost, $4,000.

J. Kadic, three-st'y dwell., 138-140 De Koven St.; cost, $10,000; architect, J. P. Huber; builders, Benes & Sayer.

C. Otradovec, three-st'y dwell., 212 De Koven St.; cost, $4,200; architects and builders, Benes & Sayer.

M. Krestufek, two-st'y dwell., 587 Nineteenth St.; cost, $2,500; architects and builders, Benes & Sayer.

P. Bartholmae, 4 two-st'y dwell., 502 State St.; cost, $15,000; architects, Cudell & Blumenthal; builder, Chas. Thiele.

J. G. Keith, two-st'y cellar and attic dwell., 522 West Jackson St.; cost, $9,000; architects, Edbrooke & Burnham.

J. F. Lawrence, 4 cottages, 85–87–93–95 Emerson St.; cost, $4,000.

A. Varvinck, two-st'y dwell., 82 Johnson St.; cost, $3,000.

J. C. Trapp, three-st'y store and flats, 3802 Butterfield St.; cost, $9,000; architect, T. Karls; builder, D. G. Robinson.

D. E. Sibley, elevator building, Thirty-first St. and Stewart Ave.; cost, $3,500.

C. V. Waite, three-st'y dwell. and store, 2624–2626 State St.; cost, $7,000.

S. M. Drake, 4 two-s'ty dwells., 5–11 Armour St.; cost, $5,000.

Helen Keeney; 4 cottages, 267-171 Hirsch St.; cost, $5,000.

Theo. A. Kochs, four-st'y and basement factory, 158–160 Wells St.; cost, $20,000; architects, Furst & Rudolph; builders, Ebertshauser Bros.

H. Schlotke, cottage, 754 West Fourteenth St.; cost, $3,000; architect and builder, A. Soula.

M. Cronin, two-st'y dwell., 879 Blue Island Ave.; cost, $3,500; architect and builder, A. Soula.

J. McNulty, cottage, 62 Henry St.; cost, $3,500.

A. J. Kasper, three-st'y dwell., 482 North Franklin St.; cost, $6,000; architect, S. M. Randolph.

H. Mueller, three-st'y dwell., 778 Sedgwick St.; cost, $8,000; architect and builder, H. Mueller.

John Murphy, two-st'y dwell., 514 Taylor St.; cost, $3,000.

Cincinnati.

BUILDING PERMITS. — Mrs. Gamble, two-st'y brick dwell., Falls St., near John St.; cost, $4,500.

Thos. Brye, two-st'y brick dwell., s w cor. Willow and Chappel Sts.; cost, $20,000.

Dr. Judkins, two-st'y brick dwell., cor. Race and Longworth Sts.; cost, $2,500.

6 permits for repairs; cost, $7,500.

Total permits to date, 678.

Total cost to date, $2,515,250.

Cleveland.

BLOCKS. — For Morgan, Root & Co., brick block on Bank St.; cost, $130,000; Cudell & Richardson, architects.

For L. E. Holden, brick block on Bond St.; cost, $40,000; Thos. Simmons, contractor; Coburn & Barnum, architects.

CHURCH. — Fairmount Presbyterian church on Fairmount St.; cost, $12,000; J. T. Watterson, contractor; W. H. Phillips, architect.

HOUSES. — For O. F. Brush, stone house on Euclid Ave.; cost, $75,000; Thos. Linas, contractor; Geo. H. Smith, architect.

For S. T. Everett, stone house on Euclid Ave., cor. Case Ave.; cost, $90,000; Andrew Dall and A. McAllistar, contractors.

For S. T. Wellman, brick house on cor. Cedar and Case Aves.; cost, $20,000; Coburn & Barnum, architects.

Three dwellings for Chas. French, on Cedar Ave.; cost, $2,800 each; J. W. Flova, builder. F. O. Bate, architect.

City forge on the Lake Shore Railway; cost, $4,500; J. T. Waterson, contractor; F. C. Bate, architect.

RESERVOIR. — High service reservoir for the Cleveland Water-Works, on Woodland Hills, capacity, about 35,000,000 gallons; estimated cost, $125,000; John Whitelaw, Supt. and Engineer.

Detroit.

BUILDING PERMITS. — John Brinke, frame house, 660 Russell St.; cost, $3,600.

F. Wittlesberger, double brick house, Ontario St.; cost, $6,400.

Petrequin Bros., 3 frame houses, National Ave.; cost, $4,100.

Board of Metropolitan Police, brick and stone headquarters, East Park; cost, $30,000; George Lloyd, architect.

Jos. Maples, brick house, Lincoln Ave.; cost, $3,200.

C. W. Shippey, brick house, 930 Cass Ave.; cost, $3,200.

Mortimer L. Smith, brick house, Woodward Ave.; cost, $9,000.

A. C. Varney, frame house, Hancock Ave.; cost, $3,000.

Milwaukee, Wis.

BUILDING PERMITS. — J. Fepertinger, brick building, for H. Beastrin, in Seventh Ward; cost, $3,000.

John Kraatz & Son, brick dwell. for N. Peters, on Third St., Sixth Ward; cost, $6,700.

J. A. McCann & Co., warehouse, for Davis Bros., on National Ave., Fifth Ward; cost, $16,000.

Edward Schmidt, 3 cottages, for B. F. Pereles, on Seventh Ave., Eleventh Ward; cost, $5,000.

New York.

APARTMENT-HOUSES. — The project proposed last spring, to build an apartment-house on the Fifth Avenue Plaza, has been revived, the ground having been purchased by Messrs. Phyfe & Campbell, for whom Mr. Geo. W. DaCunha is drawing plans.

Mr. John Harvey will build two apartment-houses with stores below, 25′ front on the north side of One Hundred and Twenty-fifth St., 300′ e of Seventh Ave.

DWELLINGS. — Seven first-class houses, brick and brownstone, 21′ 6″ x 60′ each, are to be built on the west side of Lexington Ave., between Forty-fifth and Forty-sixth Sts., for Mr. Thos. Gilford, from designs of Mr. Charles Graham & Sons, who will also be the builders.

There will also be erected, adjoining, a five-st'y apartment-house, 48′ x 95′; cost, about $52,000; same owner and architects.

HOUSES. — On the north side of Fifty-seventh St., 125′ w of Seventh Ave., 5 first-class houses are to be built on the lot, 100′ x 100′, recently purchased by Messrs. R. Sidenberg; D. & J. Jardine, architects; Wm. Gedney and Sinclair & Wills, builders.

BUILDING PERMITS. — *Beaver St., Nos.* 60 *and* 62, *William St., Nos.* 2, 2½, 4, *and* 6, *and Pearl St., Nos.* 107, 109, 109½, *and* 111, eight-st'y brick office-building, and slate roof; cost, $530,000; owner, N. Y. Cotton Exchange, M. B. Fielding, Pres't, Hanover Sq.; architect, Geo. B. Post; builders, A. A. Andruss & Son, and McGuire & Sloan.

Fifty-seventh St., n s, 100′ e Eleventh Ave., five-st'y brick tenement, tin roof; cost, $13,000; owner, Jas. Higgins, 1132 Second Ave.; architect, A. B. Ogden; builder, Jno. Keating.

Eighty-seventh St., n s, 175′ w Ninth Ave., 3 three-st'y brick dwells., (brownstone fronts), tin roof; cost, each, $9,000; owner, architect, and builder, J. M. Grenell, 1764 Broadway.

Avenue A, n w cor. Seventy-ninth St., 3 five-st'y brick tenements and stores, tin roof; cost, each, $15,000; owner, Michael Duffy, 146′ e One Hundred and Second St.; architect, A. Spence.

Avenue A, s w cor. Eightieth St., 4 five-st'y brick tenements and stores, tin roof; cost, each, $15,000; owner and architect, same as last.

One Hundred and Thirty-second St., n s, 325′ w Sixth Ave., three-st'y brick dwell., brownstone front, tin roof; cost, $15,000; owner and architect, James Barrett, 4 and 6 New Chambers St.

One Hundred and Thirty-fifth St., n s, 70′ w Third Ave., four-st'y brick tenement, gravel roof; cost, $9,000; owner, Martin Norz, One Hundred and Forty-first St. and Third Ave.; architect, John Rogers.

Lexington Ave., s w cor. One Hundred and Eleventh St., five-st'y brick flat and store, tin roof; cost, $20,000; owner, Patrick Skelly, 137 West Fifteenth St.; architect, Jno. B. Snook; builder, not selected.

One Hundred and Thirty-third St., s s, 500′ w Sixth Ave., 3 three-st'y brownstone front dwells., tin roofs; cost, each, $9,500; owner, George W. Dunn, 254 Eleventh St.; architect, John Brandt.

West One Hundred and Twenty-sixth St., No. 230, 2 five-st'y brick and stone tenements, tin roofs; cost, each, $12,000; owner, John Fullam, 2145 Second Ave.; architect, M. J. Merritt; builders, John Fullam, and R. A. Hollister.

Ninety-first St., s s, 94′ e First Ave., three-st'y brick stable and office, one-st'y brick foundry, gravel roofs; cost, $10,000; owner and builder, George H. Toop, 421 East Eighty-eighth St.

Greene St., No. 8, four-st'y brick store, tin roof; cost, $25,000; owners, Trustees of Louis L. Lorillard, No. 3 Mercer St.; architect, Jno. B. Snook; builder, John Demarest.

Beaver St., No. 18, four-st'y brick restaurant and dwell., tin roof; cost, $30,000; owners, Wiehl & Widman, 32 Pearl St.; architects, H. J. Schwarzmann & Co.; builders, J. & L. Weber, and P. J. Duffy.

West Fifty-seventh St., Nos. 546 *and* 548, four-st'y brick factory, gravel roof; cost, $25,000; owner, G. W. Hollis, Boston, Mass.; architect, Geo. F. Fuller.

East Seventy-ninth St., Nos. 156-166, 5 four-st'y brownstone front flats, tin roofs; cost, each, $15,000; owner, John J. McDonald, 1532 Fourth Ave.; architect, A. Hatfield.

Ninety-eighth St., n s, 59′ w First Ave., one-st'y brick store-house, tin roof; cost, $9,000; owner, Knickerbocker Gas Light Co., 74 West Eleventh St.; builders, Moran & Armstrong.

Ninety-ninth St., s s, 89′ e Second Ave., two-st'y brick workshop and office, tin roof; cost, $8,000; owners and builders, same as last.

West Twentieth St., Nos. 515 *and* 517, 2 four-st'y brick tenements, tin roof; cost, each, $12,000; owner, Clinton Sutphen, 20 Nassau St.; architect, Geo. B. Pelham.

First Ave., e s, 75′ s One Hundred and Eighteenth St., 2 five-st'y brick tenements and stores, tin roofs; cost, $30,000; owner, Matthew Coogan, 422 East One Hundred and Fifteenth St.; architects, Cleverdon & Putzel.

One Hundred and Forty-fourth St., s s, 425′ e Willis Ave., 2 four-st'y brick tenements, tin roofs; cost, each, $7,000; owner, Fannie T. Cole, 592 East One Hundred and Forty-first St.; architect, J. F. Burrows.

One Hundred and Forty-fifth St., s s, 100′ w Willis Ave., 2 two-st'y brick and frame dwells., tin roofs; cost, each, $2,300; owner, Martha J. Dinant, 724 One Hundred and Thirty-ninth St.; architect, H. S. Baker; builder, John Knox.

ALTERATIONS. — *Railroad Ave.*, w s, on southerly line of One Hundred and Seventy-second St., present wooden walls to be replaced by brick walls, and internal alterations; cost, $5,000; owner, N. Y. & H. R. R. Co., Grand Central Depot; builder, Jos. Richardson.

Bowery, Nos. 190, 192 *and* 194, attic raised to full st'y, internal alterations; also a one-st'y brick extension, alterations to front; lessee, Marks Arnheim, 253 West Forty-fourth St.; architect, John B. Franklin.

Ninety-first St., n s, 169′ e First Ave., raise three-st'y, and a five-st'y extension on easterly side, gravel roof; cost, $12,000; owner, John J. Schillinger, 20 East Ninety-second St.; architect, A. B. Ogden.

Broadway, No. 541, repair damage by fire; cost, $13,500; owner, Estate of Peter Gilsey, office, 1193 Broadway; architect, S. D. Hatch; builder, Henry Wallace.

East Broadway, No. 195, raise roof, and internal alterations; cost, $3,500; owner, Solomon Jacobs, 149 East Broadway; architect, E. B. Hays.

First Ave., Nos. 2317 *and* 2319, raise attic to full st'y, and a one-st'y brick extension; cost, $3,000; owner, Jacob Loeb, 209 East Houston St.; architect, Wm. Grant.

Forty-fifth St., Nos. 320–324, internal alterations; cost, $4,500; lessee, Benj. Lichtenstein, 208 East Seventy-ninth St.; architects, H. J. Schwarzmann & Co.; builders, Fessler & Wolfart.

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CONTENTS.

THOSE of our readers who are not familiar with recent building in New York should seize the first opportunity, on their next visit, to take a walk along Fifty-ninth Street, from the Fifth to the Eighth Avenues, expressly for the purpose of seeing the gigantic apartment-houses which line the southern side of the street. Considered as a novel and characteristic type of building, the New York apartment-house in its present development is worthy of attentive study, and no one who has not had some experience in planning such structures can, without study, appreciate the thought which has been bestowed upon them. It is true that there are many criticisms to be made upon most of them, but in comparison with the tenement-houses of other cities, or even those built in New York a few years ago, they show a vast progress. In place of the "unavoidable" dark rooms, gloomy corridors and unventilated kitchens and bath-rooms of ten years ago, the modern apartment-house has daylight and fresh air everywhere. The old-fashioned "light wells," opening like the shafts of a coal-mine through various parts of the structure, and conveying the smallest possible amount of light, and the largest quantity of foul odors, to the rooms opening upon them, are now unknown in the first-class houses, and in place of them we find curiously shaped courts, so arranged as to light all the secondary rooms without losing their coherence as parts of a single ample air-space. The great courts thus formed, which are to the stagnant well-holes of former days what the open country would be to a tightly-closed box, communicate in many cases with the street by means of large openings, pierced through the mass of the building every ten feet or so in height, so that the air in the streets and that in the courts is practically the same. Inside the building a similar study and comprehension of the means for securing wholesome and cheerful rooms is apparent, and instead of the bedrooms furnished only with borrowed light and air, and the bath-rooms and water-closets in still worse condition, which were once commonly found, the apartment-house of to-day is lighted, even to the most inferior passage-ways, more amply and pleasantly than the majority of self-contained dwellings. Whether the single house is, or is not, preferable to the best apartment-house as a place for living we will not undertake to say, that being a matter quite independent of technical considerations, but no person, however prejudiced against gregarious habitation, could fail, after thorough study, to acknowledge the success with which a new and difficult branch of architectural science has been developed.

THE project for erecting a monument at Washington in memory of the late President Lincoln has been revived, and it is much to be hoped that it may be properly carried out. It seems that the original fund, collected by a national subscription fifteen years ago, has sadly diminished, so that out of nineteen thousand five hundred dollars collected only fifteen hundred was left four years afterward; the remaining eighteen thousand having been spent in paying the salaries and expenses of collecting agents, with about fifty-five hundred to Clark Mills, the sculptor, for designs, and a further sum of nearly fifteen hundred dollars to defray the cost of replacing clothing lost by guests at a great ball held in the Treasury Department in 1869. The small balance left after paying for ball-dresses and the salaries of collecting agents has, however, been wisely invested, and now amounts to about twenty-six hundred dollars. A new Board of Trustees has been elected, and an appeal will probably soon be made for new contributions.

THE managers of the Garfield Memorial at Cleveland have been more fortunate than their friends at Washington, and have not only collected, but kept, a fund amounting to about one hundred and fifty thousand dollars, which they propose to expend without delay in procuring what they suppose to be a work of art, in honor of the deceased President. As might perhaps be expected from a Board of Trustees of such business ability, the art which it proposes to purchase with the money is to be of the very cheapest description, one thousand dollars being appropriated as payment for the design of a monument to cost one hundred and fifty times as much. We hope that the trustees have not set their valuation upon artists' time so low as to defeat their own object by preventing any one, however small his capacity, from accepting their invitation; and to provide, so far as may be in our power, against this unfortunate result, we desire to encourage gravestone manufacturers' apprentices and kindergarten pupils by calling their attention to the fact that the compensation announced for the successful model, although the meanest, with one exception, that we ever knew to be offered for any artistic work, is yet sufficient to pay the fortunate designer a small stipend for the time needed to stick a few ready-made "emblems" and stock modeller's figures around a block, in such a way as to pass muster among a jury of politicians and financiers.

TWO very important results have followed from the recent lock-out of the Pittsburgh window-glass manufacturers, the most unexpected one being perhaps the departure of a considerable number of the Pittsburgh men for Belgium, where they are to work at good wages for the great glass-blowers at Charleroi. Some time ago, one of those excellent reports which have made our consular service so useful quoted the wages for glass-workers in Belgium at from one hundred and ten dollars a month for first-class blowers down to eighteen and twenty for laborers, but the rate has advanced since then, and as Belgium is perhaps the most thrifty and economical country in the world, the real value of any given salary is much greater than it would be here. Of the other operative glass-workers, a considerable number are engaged in perfecting a plan for undertaking the manufacture of glass on their own account, and it is said that the necessary capital is secured, and a favorable place for the business selected. One may be excused for doubting whether a capital of a million dollars will be managed so judiciously by a committee of workmen as to insure the financial success of this undertaking, but it does not follow that the trial is not worth making, if only for the sake of the experience in money affairs which it may bring to men who have no other way of learning one of the most important of all sciences; and it is at least a satisfaction to observe the manifestation of American enterprise and self-reliance among so important and influential a class of men, as a relief from the aimless howling which has hitherto been rather characteristic of labor troubles in Pittsburgh.

THE Congress of Americanists, which met this year at Copenhagen, naturally took advantage of its proximity to the scene of ancient Norse activity to investigate the evidences of the early exploration of America by Norwegian voyagers. That Scandinavian vessels reached the Western Continent at least as early as the twelfth century is certain, and one of the papers read at the Congress maintained that in the year 1000 the advance of the Norse pioneers by way of Greenland, Labrador and Nova Scotia had extended as far south as the present state of Virginia, which the writer believed to have been the Vinland mentioned in the chronicles. These visits were continued, and at some period a considerable settlement seems to have existed on the American coast, although, being maintained probably simply as a post for the convenience of fur-traders, and collectors of timber and dried grapes, no buildings of a permanent character were erected, and no traces now remain of

it. Some ancient maps were laid before the Congress, containing a representation of the coast-line of Greenland, from observations made in the year 1427, and accurately indicating the conformation of portions of the shore which are now rendered inaccessible from the sea by the ice which constantly lines them, and as land surveys could hardly have been within the means of the officers of trading vessels, it would appear that the climate four or five hundred years ago must have been materially warmer than at present. A letter was also presented to the Congress, written by a Norwegian priest about the year 1265, which described certain voyages made toward the north by some Greenland sailors, who reached a strait which opened into a large bay. The description of the strait answers accurately to that of Smith's Sound, and the bay at the end corresponds perfectly with the open Polar Sea which Mr. Morton reached over the ice after so much effort thirty years ago. The account given by Mr. Morton of the variety of animal life found on the shore of the open sea is curiously recalled by the old Norseman's letter, which relates that the sailors from Greenland were unable to land on the shore of their "bay," on account of the multitude of bears.

THE progress of the movement toward the establishment of a uniform standard of time in this country has been so rapid that another month will probably see the new regulations adopted by all important railways in the United States, and by a large number of cities and towns for local purposes, followed, of course, in and near all such towns and railway routes by a corresponding change in the adjustment of private clocks and watches. In Boston, where local time has for many years been very accurately established by daily signals given from the neighboring Observatory of Harvard College, much interest has been felt in the new scheme, and the city authorities, in consultation with the Director of the Observatory, have decided to substitute the new for the old standard on the eighteenth of November next. The difference between mean solar time at Boston and the standard time is fifteen and three-quarters minutes, and on the day appointed the noon signal, which is rung on the fire-alarm bells, instead of sounding at the moment when the sun crosses the theoretical meridian will be deferred for the quarter of an hour necessary to bring it into accordance with the standard noon, which will thereafter stand in place of the theoretical noon. A certain amount of annoyance will undoubtedly be caused by the reform, and as the hours of business will naturally continue the same, the prolonging of every working day sixteen minutes further into the evening will involve an addition of perhaps ten or fifteen per cent on an average to the yearly gas bills of those who live within seven and one-half degrees east of each standard meridian, while the dwellers within an equal space to the west of the meridian will find their expenses for artificial light correspondingly diminished.

A QUESTION of very great importance to the architects of public buildings is raised in *La Semaine des Constructeurs.* It seems that what we should call a "city architect" in a certain town of France made plans some years ago for buildings for municipal purposes. A commission of the municipal council approved the plans, and they were sent to the higher authority, the Council of Civic Buildings, which directed that certain unimportant modifications should be made in them, which was done, and they were put in hand for execution. The buildings are now nearly completed, and are tumbling down. The contractor asks for his money, but the city refuses to pay for the building until the architect shall have accepted it, and this the architect hesitates, very naturally, to do. A commission of experts has decided, unanimously, that the plans are vicious in several points; and the question is, who is pecuniarily responsible for the failure? Must the cost of reconstruction fall upon the architect, or does the approval of his plan, both by the municipal council and the higher authority, with, moreover, the alterations made in his scheme, relieve him of strict accountability; and in this case, is the city bound to pay the bills?

THE reply of *La Semaine* should be taken to heart, for it seems to us certain that the law in the United States would under such circumstances be the same as in France. As to the responsibility of the architect for loss caused by defects in his plans, it asserts without hesitation that the approval of the plans by the two councils does not in any way relieve the architect from the consequences of his carelessness or ignorance. This is in itself important to remember, but *La Semaine* goes on to speak of another consideration more important still. "If, however," it says, "the architect executed the work as the hired agent of the town, that is, as a salaried employé, the town must pay the cost of the reconstruction made necessary by the faults of the plan, since no legal responsibility attaches to an architect unless he has been paid by a percentage on the cost of the work, and not by a regular salary." The principle upon which this reasoning is based forms a part of the common law of this country as well as of France, and takes the form that any person doing work for another person, and paid regular wages, is to be considered the agent or servant of his employer, and the employer is accountable for the faults or carelessness of his servant; while a person doing work for another under a contract, or for a fixed price agreed upon between the parties, is no longer an agent, but is responsible for all the consequences of his own misdeeds, or of those committed by the persons whom he in his turn employs.

ONE of the most recent experiments in chemistry had for its object the liquefaction of ozone, the variety of oxygen which is produced by the passage of an electrical discharge through the gas in its ordinary form. Every one who has stood near an electrical machine of the old-fashioned frictional kind will recollect the peculiar penetrating odor which accompanies the production of sparks, and which is due to the conversion of a part of the oxygen of the air into ozone. By transmitting a succession of electrical discharges through oxygen under great pressure, and cooling the tube containing the gas to a temperature of about one hundred and twenty degrees below zero, a small quantity of a deep blue gas was obtained, which on further compression condensed into a blue liquid. By introducing carbonic acid gas into the ozone mixture, and then compressing and cooling it, the carbonic acid liquefies, with solution of the ozone, which colors it blue. A very curious natural phenomenon, involving the liquefaction of gases, has been lately observed in studying a mineral from Connecticut, known as smoky quartz. This mineral, which consists of masses of discolored rock crystal, contains a great number of small cavities, which are seen to be partially filled with some liquid. On breaking a piece off a crystal containing such cavities a sudden snap is often heard, as if the hard silica had been ruptured by a pent-up force; and on heating a portion of the mineral it bursts with great violence. By warming some crystals gently, the liquid contained in the cavities was observed to disappear at a temperature of thirty-one degrees Centigrade, reappearing on cooling, and as this is just the point at which carbonic acid liquefied by pressure under such circumstances resolves itself into the gaseous form, it was inferred that the fluid contained in the cavities must consist of this substance. By breaking up a number of crystals, and collecting the contents of the cavities, this inference was confirmed, the mixture yielding carbonic acid combined with a certain amount of water. A little nitrogen was found to be combined with the other substances, but the quantity was very small. The most difficult part of the inquiry is to account for the presence of the little drops of gas, under enormous pressure, in the interior of hard crystals. If deposited there millions of years ago, during the formation of the crystals, it would seem that the elasticity of the gas should have enabled it to force its way out of the plastic substance; while, if we suppose the cavities to have been formed after the quartz crystals were complete, we have before us a still more difficult task, to account for the introduction of the compressed gas through the hard silica.

THE attention of the State Board of Health of Connecticut has, according to the *Scientific American*, been called to the fact that the workmen in certain factories in Bridgeport, where the well-known red cocobola wood, brought from Panama, is used for making knife-handles and other articles, have been seriously poisoned by the dust from the wood. The sawdust is said to cause swelling of the face and hands of those using the wood, and children playing where a quantity of it had been thrown out were badly poisoned about the feet; while in the neighborhood of another factory all the chickens are said to have died from accidentally swallowing the dust which settled upon the grass. We remember hearing once that the California redwood was so poisonous that the dust from the saw-mills killed the fish in the streams which flowed from them, and perhaps the cocobola is really responsible for an effect which seems to be unjustly attributed to the redwood.

SPANISH ARCHITECTURE.[1] — II.

SEVILLE (*continued*).

THE Alcazar at Seville, more of a palace than castle now-a-days, is visited by all tourists who can get access to it, and has been often described. I have little desire to add to its chronicles. It is an odd assemblage of the beautiful and the repulsive in art — of the interesting and commonplace in archæology. A checkered history of eight centuries, from the old time when Prince Abdu-r-rahman Anna'ssir Lidin-Allah caused it to be built in Oriental splendor, upon the site of an ancient Roman palace, down through the years of alterations and extensions, Gothic and Renaissance, of whitewashing and disfigurement, to the restorations of latter days, has made it what it is. Much of the old Moorish and later Gotho-Moorish work is highly attractive and worthy of study, but the charm of it is lessened by contiguous fantasies of the Rococo fashion. The gardens do not deserve the lavish praise bestowed upon them; the many beauties they have are marred by extravagant caricatures of architecture in stucco and paint — nightmares of uncouthness, instead of dreams of beauty as they were conceived to be. Still it is pleasant to forget the critical mood and linger in some of the charming apartments, to read or hear one of the thousand legends which attach to it — stories some of which connect our own times with the old past as much as do the buildings themselves. The following tale for example: "Here in this chamber, Don Pedro, the Cruel (well he deserved the adjective), caused to be murdered Abu Said, who, fleeing from political trouble at Granada, was promised protection by the Spanish king, and found instead robbery and death. His wealth and jewels were too much for the cupidity of the despot, and might was right in those days. Among the treasures thus stolen was a great ruby which Don Pedro afterward gave to the Black Prince of England, and it is said this is the same gem which Melville sought of Queen Elizabeth, as a present for Mary, Queen of Scots," and, as Ford tells in his book, it is now one of the adornments of the royal crown of England. This is a type of the stories which guides relate, undoubtedly true in the main. They are many, too: tales of blood and tales of love by the score, and the traveller who stands on the scene of their horrors or delights may well be pardoned if he lets the deep interest of the past enhance his appreciation of the relics that remain, especially when the relics are themselves so charming as are parts of the Alcazar at Seville.

Another aspect of this old city, another leaf from its history, is to be found in wandering through the byways and side streets and the old thoroughfares which modern "life" has almost deserted. Many an old house and palace, with a history to fill a book, may be seen, degraded to common uses, yet retaining many charms and beauties; and in retired streets — tortuous ways often, with uncertain endings — are to be found old monasteries and convents, with high stuccoed walls and ponderous gates. One can often make his way into a bare, deserted-looking court-yard, giving access to a church of large, cold appearance, where the mass is regularly said for a meagre congregation of the faithful, from the poor who live around the ancient buildings. A characteristic feature of these places is the belfry, an arcaded gablet raised upon the massy wall, carrying the bells in its arches, open to the air (when a bell is intended to be heard, this is a way of hanging it which deserves more frequent adoption). Usually, as in that which I illustrate, they are decorated a little more freely than the rest of the exterior. In this example the details are enriched with deep-tinted glazed tiles, a beautiful blue, glowing with bronze reflections in the sunlight; then the bits of old red and brown brick, mingled with moss-green rain-stains, make up a glorious study for water-colors, which the print of course loses. Another monastery, S. Isabel, gave my pencil occupation. The great doorway at one side of a broad, dreary square, seemed to me to be a good specimen of the Spanish Renaissance when it is not overburdened with meaningless detail. Generally any attempt at richness in ornament results in the stone being tortured into such unnatural shapes that more disturbance than decoration is obtained for the architectural features to which it is applied. Here all is more modest and in better taste. The composition is good and well proportioned, has some originality, and there is good detail in mouldings and carving. The figures in the panel over the door are very good in execution as well as design. There are in Seville many such bits, more useful to the student than the exuberant works oftener illustrated.

CORDOVA.

The route from Seville to Cordova reveals several picturesque bits of scenery, with ruins of towers and castles now almost as rugged as the hills which bear them. One I noted in the little sketch above made near Almodovar. It is another of the works of Don Pedro the Cruel; a most picturesque pile, one of those which made me think my travelling was too hurried, since I had not time to stop and sketch it better; but travelling in Spain is full of these thoughts, the country is so rich in subjects for pencil and brush.

Soon I was in the marvellous old city of Cordova, duly lost in the bewildering maze of narrow, crooked, winding alleys of which it is composed. They are positively the most perplexing I ever saw in Europe; Morocco has some to equal them perhaps, but even there the ways are not more systematically misleading. Cordova's streets not only lack definite direction, they seem to be laid out especially to misdirect; an enemy might carry the walls by storm, and then in endeavoring to reach the interior of the place would get into streets leading back to the breach. But how delightful it is to ramble about those paved passages: to start from the hotel with some definite objective — the cathedral perhaps, or the bridge; — to note carefully the bearings of one's destination, the time o' day, and the position of the sun; and after all these preparations to walk into two or three "blind" alleys, and one interminable lane, and at last realizing that you are hopelessly lost, to be compelled to consult a small boy and engage him to pilot you to the desired place; or better, perhaps, if you have time to persevere alone, lost though you be — what if you do not get to the cathedral that morning? — you will probably strike a street you remember about lunch time and find the hotel after awhile, unless you look for it. Once in Cordova when I was thus thrown out of my reckoning — I had started half an hour before to go somewhere, and had explored a good mile of street — I found my hotel in front of me so unexpectedly that I thought it had a twin counterpart. And there is a great open square used as a market-place, and generally thronged with people; I walked all round that square one day outside it, before I could find the way in. Such are the old streets of Cordova.

Who has not heard of the mosque, the forest of columns so extensive that a great Christian cathedral has been built in its midst, and is concealed there as it might be in a wood? It is enchanting. The poetical descriptions, even if exaggerated seem to be justified, and one feels reluctant to condescend to bare facts about it. However, I learned some few, proper to note here. The mosque was begun in the year 786, displacing the old basilica which had itself taken the site of a Roman temple of Janus. So this is a historic site indeed! In 961 the mosque was enlarged, and again in 988. The great court-yard, 210' x 430', was built in 937, and with its orange trees and fountains, and lofty, picturesque belfry-tower is now a beautiful place in itself. From it the mosque is entered by three doors in the ends of three of the nineteen aisles, all of which formerly opened to the court. Inside, the varied columns lead the eye in every direction along vistas and perspectives, lateral, diagonal, transverse, of marble and porphyry, with superb effect. These columns are of many materials and sizes; some belong to the old temple, others to the basilica, others were brought from afar — spoils of war — many were made for their present position; their sizes, and shapes, and capitals differ, but only so much as to increase the effect and the interest in them. Then there is a very pretty play of light and shade in the irregular lighting of the building, some aisles gloomy and dark so that the view ceases in mysterious shadows, suggesting even greater depths than exist; and again other parts will be bright with the tinted light of some stained window or skylight. It is said that originally no light was admitted except at the sides. What beautiful and impressive vistas these must have been with their multitudes of swinging lamps! In some parts there are splendid specimens of Moresque detail in the curiously doubled arches, and in the Maksurah and the Mihrab, and in the screen of the Chapel of Villa Viciosa. It is impossible here to attempt their description; drawings only can show their complications of arch and column, and many exist already. The greater part of the mosque is less ornamented, such as is seen in the forepart of my sketch of a part of the interior. There are about thirty-eight columns in the length of each of the nineteen aisles; but the cathedral crossing the middle of nine of them intercepts five or six in each; while elsewhere doubled and grouped columns increase the number. It is said that originally there were 1200, and that now there are 1096; but I thought that including those of the court-yard about 800 would be nearer the truth, and I felt that as I could not say whether 800 or 1096 were the true number, it did not much matter as regards the effect. The "*Coro*," or choir, built in 1523–1593, was, it is recorded, protested against by the city corporation, but the Church had her way, with the king's (Charles V.) authority, but when the king visited the city later, he reproved the Chapter thus: "You have built here what you or any one might have built anywhere else; but you have destroyed what was unique in the world."

A most interesting ramble is that by the bridge over the River Guadalquivir. There is a specimen of Herrera's architecture in a great Renaissance arch or gateway which replaces an old Moorish one. It is decidedly more pleasing than most of Herrera's work, not so chilling and repellant; but part of its effect is owing to the picturesqueness of age. Its predecessor was the "Gate of the Bridge," probably a real stronghold, like those which in other places the Moors built to defend the passage. Passing this, the roadway of the bridge itself stretches across the ancient-looking stream, and seems to be almost as old, for it is crooked and out of level in every part, and its arches and masonry are the queerest mixture of Roman, Moorish, and modern handiwork. Looking to the left, up the river, the strangely grouped buildings of the city jostle one another on its banks, — small rectangular buildings mostly, with here and there a

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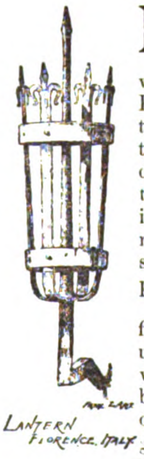
[1] By Robert W. Gibson, Travelling Student of the Royal Academy. Continued from page 172, No. 407.

longer stretch of wall enclosing a garden, whence the rich verdure of the orange trees peeps over the top; and from among the whitened and tinted dwellings the Belfry and several other church towers rise in charming variety. Down the river one gazes upon a quaint series of stone dams and mills, some disused and fallen into utter ruin, all more or less decayed and time-worn, but some yet working in a plodding, sleepy, old-time manner, with movements more suggestive of venerable antiquity than even complete stillness would be. Many of these, too, are entitled to lenient judgment, for they also are the works of the Moors, and have served mankind in their primitive way for centuries.

Then, as we wander on over the uneven way, we come to a queer-looking castle upon the opposite bank, not very picturesque, being in too good a state of repair, but still in sufficient keeping with the surroundings. From here, and on the way back, the city is very well seen, and it is good to loiter and look a little, and think of the venerable stones around and underneath, and the strange strivings of humanity, of race against race, for generations and ages, which made the story these old relics illustrate. Meditation will not be much disturbed now, upon this viaduct where formerly crowds jostled on their busy way. An occasional swarthy peasant or market-dealer, with his mule or donkey, pannier-laden, will pass and look at you with lazy curiosity, and now and then a human voice will break into the silence from a little distance; but you can lounge and dream of the past for hours, without more serious interruptions than these. The city is not very big now, yet it is said that it once contained a million of inhabitants, and not far away, in the city of Zahra, stood a palace worthy the chiefs of the great realm of Cordova. It extended 2200 feet by 4000 feet, measured upon its enclosing walls, with gardens and courts and fountains far surpassing those of the renowned Alhambra; a mosque. seventy-four feet by one hundred and forty-six feet; halls of marbles and rare stones, with forty-three hundred columns supporting roofs of carved and gilded cedar, and a multitude of chambers decorated in richest arabesques and interlacing patterns. So say the historians of the Spanish Arabs of nearly a thousand years ago, and as they also described the mosque which exists, and thus prove the correctness of their records in that respect, we may believe what they relate of this wondrous palace, although only a few stones still remain of its splendors. Certainly this Cordova was a great kingdom, rich and powerful, and its history and legends are full of romantic interest, and deserve a few moments' pondering by the modern traveller here upon their ruined scenes.

PERUGIA.



RISING in a golden haze, each tower and long sweep of roof in silhouette against the sky, it seemed but a few miles away. To find after watching for the next mile-post, that it recorded 23 Kilometri da Perugia was like some ill-considered trick of Tantalus. The day had been a gray one, and the clouds, undecided whether to close their ranks or disperse altogether, at length appeared disposed to attack, and it was through one of the fast closing rents in their line of battle, that the sun's rays fell and glorified this city far away. The rent closed, a gray mist swept across the east, and we plodded on toward the point where we had seen our haven.

"*In Perugia sempre pioggia.*" The proverb was justified that night. Two more moist individuals than crept up the little brick-paved lanes and under dripping arches would have been hard to find. As we emerged from beneath an arch into the Corso, the sign of the Albergo dei Belle Arti seemed particularly attractive; it suggested by its name possibilities of the pleasant Bohemianism we had left behind us under the shadow of the Pincian, but it sadly belied all such hopes. In such circumstances, the only thing to be done was to make a virtue of necessity; and as the next day dawned bright and clear, we soon regained our wonted spirits.

Perugia, like Siena, stretches along the crests of several spurs of the Apennines, and creeps down their sides into the valleys between, but the law of gravitation is reversed, and the larger buildings crown the ridges. It still keeps well within its old walls, though north and south two small faubourgs are encroaching upon the meadows. Its heart is the Piazza del Duomo, and its chief artery the Corso, which runs south to the terraces of the Prefettura; from the Corso descend the quaintest possible streets, here and there widening into terraces, from whose walls the vistas over the great undulating country towards Chiusi, or towards the Apennines behind Assisi are one constant succession of delightful effects of changing shadows and beautiful color. From its position alone, its clambering up hillsides and down vales, Perugia is necessarily intensely picturesque, apart from its architectural features; but when to this natural advantage is added the effect of a series of buildings in which imagination and dignity of conception are combined in the happiest proportions, the result becomes very nearly ideal. Of distinctive, individual architecture that can be called Perugian, there is perhaps little: phases of both Gothic and Renaissance that resemble, and yet differ from other phases in other Italian cities are abundant. It is superfluous to condemn the restless character of the modern architectural (and popular) mind that, craving a conspicuous individuality, consequently descends to imbecile eccentricities. That matter will eventually settle itself. Why an acknowledgment of the value of good precedent should be considered equivalent to a lack of originality, is a question which admits of but one interpretation,—that the people who so consider it are ignorant. Perugia is an excellent example of work which is intrinsically good, and yet does not assert itself as isolated.

Upon the Piazza del Duomo are the Duomo, the Palazzo Comunale, and the remains of the old Palazzo del Podestá, which was twice destroyed by fire.

The Cathedral, of fifteenth-century work, has never been completed; a diaper of alternate white and dark marbles forming a dado of some 12 feet in height is carried around the exterior. Judging from work elsewhere in Perugia, and from the fact that a portion has been finished in the same manner higher on the north wall, it doubtless was intended to cover the entire walls with this diaper, the effect of which would certainly have been disagreeable. Diaper-work of large design is good when complying with two conditions; first, that it should be contrasted directly with finer work; second, that it should have a dominating tone throughout. Age supplies this tone frequently, but even the mellowing influence of time fails to harmonize white and very dark marbles, such as are used on the exteriors of Perugian churches.

Upon the south of the Duomo is a bad seventeenth-century entrance, with a fairly good wooden door, at the side of which is a pulpit. The interior is badly proportioned, and poor in color; the transepts are short, and the columns too high for the vaulting.

Symonds in his "Renaissance in Italy" (Vol III, pages 51-53), says the Italians "never rightly apprehended the specific nature of Gothic architecture . . . instead of one presiding all-determining idea, we must be prepared to welcome a wealth of separate beauties wrought out by men of independent genius, whereby each part is made a master-piece, and many diverse elements become a whole of picturesque, rather than architectural, impressiveness." The Palazzo Comunale of Perugia is one of the few contradictions to the statement, but it is a decided one. Begun in 1281, continued while Arnolfo del Cambio was moulding by his genius the tower of the Foraboschi into that daring tower of the Palazzo Vecchio, while Maitani wrought his fancies into the façade of Orvieto, its construction went on during that period when dignity and power of expression were the pre-eminent characteristics of both the people and their art; its simplicity is classic; its proportions so just that it requires a mental effort to appreciate their delicacy. In perfectly proportioned buildings the satisfaction derived from the adjustment of parts is so fused into the impression made by the complete whole, that an immediate consciousness of an attempt to balance proportions nearly invariably implies that they are ineffectually disposed. Nothing could be better than the two stories of windows, with delicate columns separated by a broad, contrasting mass of wall, or the broad steps leading to the great door. The door upon the Corso is particularly fine in proportions. The bell-tower, a comparatively recent addition, is manifestly superfluous. The restorations recently made here are excellent. Of the old Palazzo del Podestá, a few arches with piers, with octagonal, broad, simple caps alone remain. The Fonte Maggiore with its sculpture by Del Cambio, and Niccolo, and Giovanni Pisano, is rich with twisted shafts of all descriptions, and is most dignified in conception. Near the Corso the palaces are numerous; most of them are Renaissance, though some are Gothic, the Palazzi Baldella and Baldeschi are the best upon the Corso, while to the east, upon the Piazza Sopramura the Palazzo del Capitano has a fine entrance and balcony, and the Tribunali is especially good in proportions. It is this quiet, careful study of proportions that makes these buildings in Italy of the fourteenth and early part of the fifteenth centuries of so much more value to a student than the wealth of imagination displayed in after years or in other lands. The perception of the Greek appeared anew in the Italian, and concerned itself with the matter at hand, adapting the new conditions to its will. Such buildings as these, as unconscious of their own simplicity as of their beauty, are precisely among the class of works which the student mind, prone to a love of detail and "bits" instead of entities, is very apt to glance at casually, possibly pronounce good, and pass over for some seductive piece of *tarsia* or mosaic. Description of such

work is necessarily meagre; drawings, good though they may be, seem thin and poor; details, though refined, fail to tell their story; the impression of the work itself can alone fully justify all praise bestowed upon it.

Nowhere in all Italy is the power of a controlling mind more manifest than in the Umbrian and Etrurian cities; north and south, rich color and dainty fancies exercise their charms; the façade of Pavia, the marbles of Venice, the mosaics of Palermo, Ravello and Salerno appeal to the sensuous delight of the eye, and by their delicacy and refinement nearly persuade the senses that they are all sufficient; but the Umbrians in their architecture as in their painting, struck deeper, and stirred emotions which, though they might defy analysis, convinced with their sense of supremacy by their very presence. It seemed impossible for these Umbrians to do otherwise; the spell was upon them. Benedetto da Majano beginning by making delicate *tarsia*, ended by raising the Strozzi. Arnolfo del Cambio working on the confused bas-reliefs of the Pisanos, at length conceived the Palazzo Vecchio. These men above all things loved the inspiration of the Greeks, (Ghiberti even reckoned time by Olympiads,) yet they worked naturally and without pedantry. Whether this was the inevitable fruition of the time or the intense individuality of the men will be long disputed; but the study of both cannot fail to be of the greatest value to the student.

Besides the palaces, what remains in Perugia consists largely of picturesque bits. Of the churches, nearly all of which have choir-stalls of beautiful carving or of *tarsia*, S. Agostino is the most interesting in plan, being circular, with a dome carried by sixteen columns, and with chapels around its circumference. The Oratorio of S. Bernardino (1459) has a very fine façade of colored marbles and terra-cotta, of which the bas-reliefs and decoration, though over-rich are still agreeable, because of their slightness of relief. S. Ercolano is a peculiar octagonal structure. Outside the Porta S. Pietro is the Basilica and monastery of S. Pietro de Casinensi founded about 1000 A.D. It has a transept and a flat gilded ceiling. Above the nave columns are a series of poor paintings by Vassillachi, and the decorations and color of the church are decidedly bad, but despite of this it is effective, as all basilicas invariably are. Behind the church is a picturesque monastery. The tower (evidently a fifteenth-century erection) needs but a slight alteration of proportions to be made an excellent one: alternate narrow courses of brick and stone are used in the upper portion as in Seville, Toledo and other Spanish towns. S. Domenico just within the gate has a rather good window in the apse. There are considerable remains of the old walls, some of which have been utilized as retaining-walls to support the terraces; others, especially the round towers, have been converted into houses. The old Etruscan gate is one of the finest in all Italy, its breadth and simplicity are so happily contrasted with the loggia erected upon the remains of one of the towers after the conflagration. It makes an impressive entrance. Near the Piazza d'Armi is the old church and monastery of Santa Giuliana: the guide-books scarcely mention it, yet it has a charming double cloister of excellent proportions, with brickwork used very cleverly. The monastery is now used as a Military Hospital, but a request to see the "*Chiostro*" would meet with the pleasantest response from the old sergeant at the gate, who has his share of the universal Italian delight in having strangers admire the things of his "*patria*." The cloister has a wealth of octagonal caps and corbels, some forty of good design, and the tower is exceptionally good.

It was pleasant in the shadows of the cloisters as the sun got low, late on summer afternoons, to sit and watch the gray-robed sisters of the hospital in their white caps, helping a convalescent creep out to the wall of the Piazza d'Armi, where he would wistfully watch the Bersagliere march and wheel to the quick note of their bugles. Far away to the south a white tower caught the last rays of the sun. It was the old convent church of the blessed St. Francis of Assisi, the church which Giotto and Cimabue had made rival in its wonderful color the marbles of St. Mark's and the mosaics of the Capella Palatina. It sent its invitation across the miles of campagna to us upon the walls of Perugia, and at last we turned our faces toward it and left those walls behind us.

C. Howard Walker.

Cremation at Lisbon, Portugal. — In consequence of a want of cemetery accommodations and of the proximity of her burial grounds to populous quarters, the Municipal Council of Lisbon has passed a resolution by which the cause of cremation will be advanced. In times of epidemic cremation will hereafter be made compulsory in Lisbon, though in ordinary times it will be optional; but once in every five years the remains of interred bodies will be burned.

Ancient Rome and Modern London. — Professor Lanciani, the archæologist, has drawn a comparison between ancient Rome and modern London founded on his own examinations and on history, in which he calls attention to their similar situations on a river and to the respective heights of their soils. Rome, he says, had her "city" in the sense that London has hers, and when Augustus reorganized the municipal administration the limits of the town had so much exceeded the circle made by the walls of Servius Tullius that four of the fourteen districts into which the city was divided were entirely outside the walls, but in spite of this the names of the old gates survived as similar names now survive in London, which has also far extended itself beyond its early borders. At one time the buildings of Rome occupied a space of about the same size as is covered in our day by the buildings of London.

LOW CEILINGS.[1]

The height of the ceiling affects both the owner and the occupier of a dwelling, but chiefly the occupier, for, whereas it affects the owner's pocket only, it affects both the pocket, the comfort, and the health of the occupier. If the owner is perfectly free, he will simply adopt the height of ceiling which he thinks will enable him to get the largest return from his property. It by no means follows that he will adopt a low pitch; but if the ground he builds upon is dear, and the demand for houses great, he will be tempted to make the stories low and increase their number; and in so doing he will be doing what is at once best for himself, and also — unless he make the rooms small as well as low — what is best for the community.

But in most of our large towns and populous places a person about to build is not free. He must build in conformity with regulations limiting the total height of his building, and prescribing, among other things, the height of ceilings and the cubic capacity of rooms. Hampered by such restrictions, he cannot suit his houses to the requirements of the districts where they are wanted; he must make them as Parliament has been pleased to prescribe, however extravagant or unsuitable for the people who require them, and he must get a profitable return for his expenditure from these very people, who don't wish extravagance, and can't afford to pay for it, but who, in the circumstances, either *must* pay for it or do without dwellings. For example, if the Police Bill drafted by the Corporation of Glasgow became law, a man having land bounded by a new street forty feet wide would not be allowed to erect a tenement of dwellings in that street more than two stories high, with this necessary result, that his return for the cost of land and buildings must be got from two tenants instead of from four or six. If left to his own discretion he would at a small additional outlay, make his buildings, say, four stories high, and — profitably to himself — accommodate on the same ground twice the number of tenants at lower rents. Now, assuming in the meantime that the four houses erected in this way were as good as the two made in conformity with the Police Bill, it must be perfectly obvious that, whether the owner made more out of the transactions or not, the erection of the four would be distinctly most advantageous for the tenants, and therefore for the community at large; because in this way twice the number of people would get accommodation where they want it — not where the Corporation say they ought to want it — and they would get it at a greatly reduced rent, both, I submit, considerations of the very greatest importance, and having a direct bearing on sanitary questions of great interest. Of course, if it could be proved that high ceilings and low tenements were essential to secure healthy conditions, a great deal could be said in favor of compulsory sanitation in that direction, although even in that case I should be prepared to say a great deal against it; but it has been abundantly proved — and this was very clearly brought out at the Newcastle Congress — that there is no necessary connection between density of population and a high death-rate; and I may say that the very same statistics — namely, those of the various improved dwellings' companies — which most conclusively prove this, as conclusively show that there is quite as little connection between low ceilings and a high death-rate, as in all these dwellings the ceilings are low and the stories numerous. Most people, however, in this part of the country at all events — I may venture to say most sanitarians — still cling to the idea that *cæteris paribus*, a room with a high ceiling is a more healthy dwelling than one with a low ceiling. Now, I wish to strike at the root of this prejudice, which as affecting legislation has had — and may, unless eradicated, still have — most pernicious results, and I hope to be able to prove that, other things being equal — that is, that, given two rooms of different heights, but of the same capacity, having the same size of chimney opening, the same area of window, door, and vent openings — the lowest will be the cheapest, the most commodious, the most comfortable, and the healthiest dwelling of the two.

I shall dwell chiefly on the sanitary aspect of the question, merely devoting a sentence or two to the other important points I have mentioned. One of these, the greater extent of floor area in a low than in a high room of the same capacity, is self-evident, and the advantage of this to the occupant is equally obvious. The economy of the low pitch is not quite so readily understood. For the sake of illustration, I have calculated the rents which must be charged for houses of 2,000 feet capacity in order to yield five per cent, arranged in three different ways; first, in tenements of two stories of ten feet;

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[1] From a paper read by John Honeyman, F. R. I. B. A., September 27, 1883, at the Congress of the Sanitary Institute of Great Britain, held at Glasgow, and published in the *Architect*.

second, in tenements of three stories of eight feet; and, third, in tenements of four stories of eight feet; allowing a proportionate area of vacant ground in each case; and I find that in the first of these — the two-story tenement — the rent would require to be £9 6*s*.; in the three-story tenement it would be £8 5*s*., and in the four-story tenement, £7 14*s*.; so that the artisan contented with an eight-foot ceiling might have a roomier house for £7 14*s*. than he can possibly get for less than £9 6*s*., where restrictions already referred to exist. In other words, he is compelled to pay £2 8*s*. per annum, or fully a third more than might otherwise be required, and at the same time he must be content to occupy a smaller house in a less convenient locality, without one solitary compensating benefit, merely because some sanitarians, chiefly municipal, think such treatment good for him. To my mind it is unmitigatedly bad, and a very serious matter for our working classes. For observe, it is impossible to take this £2 8*s*. out of the owner's pocket; the tenant must pay every penny of it, as, of course, no builder in his senses is going to put up dwellings which will not yield him five per cent at least.

But the important question remains — would the low house be healthy as well as cheap and roomy? In my opinion it would, and in a greater degree than the high house. The means of ventilation, which alone are admissible in such dwellings, being of the simplest possible kind, it will be found that it is easier to ventilate a low room than a high one by their agency. Practically, the ventilation must be effected by the admission of fresh air by doors and windows — or round these when closed,— through the badly-fitting joints of floors and skirting boards, or by special inlets not intolerable to the inmates (if such can be devised), and by the extraction of air by the chimney. Such means have been found sufficient, except where apartments are overcrowded, that is, except where the chimney is insufficient as an extractor. We may take it that in any room having a door, a window, and an open fireplace, three or four people may sleep safely, and the condition of the air will depend not so much on the capacity of the room as on the area and draught of the chimney. Those who are familiar with the subject, will, I trust, excuse me if I say for the information of others in this mixed audience, that even such a capacity as is prescribed in our Police Bill — 400 cubic feet to each adult — is utterly insufficient unless we have along with that a constant and rapid change of air. But to effect this change so that the whole volume shall be kept up to a safe standard of purity, it is necessary that the fresh air should be properly distributed and permeate the whole apartment. This point I fear is sometimes lost sight of. For example, if we take a room of 2,000 cubic feet with five inmates, to keep the air, not as pure as we could wish, but in a tolerably healthy condition, at least 5,000 cubic feet of fresh air would require to be passed through the room per hour; and as an ordinary open fire will easily extract that quantity, there seems to be no great difficulty about it; but observe, it is quite possible to pass all that quantity through the room without purifying the atmosphere in any appreciable degree; we may let it all in at one side of the room and up the chimney at the other, leaving the air breathed by the inmates impure and poisonous, perhaps fatally; so that the more complete the distribution of the fresh air, the more beneficial will the ventilation be. Now the facility of distribution will depend to a large extent on the form of the room. If the room (always bearing in mind that we are speaking of rooms of the same cubic capacity) be high in proportion to its area, and the fresh air be admitted in the usual way referred to, the lower part only will be ventilated, and a large proportion of its atmosphere will remain impure; whereas, if it be low in proportion to its area it will all be well ventilated, and the inmates will get the full benefit of the room's capacity. In the other case they would not, as a considerable proportion of the high room would remain stagnant and foul; a condition objectionable on other grounds.

But, it may perhaps be said, granting that the air in the upper part of the room, say a fourth part of the total volume, remains unaffected, and that the 5,000 feet per hour allowance is distributed in the lower part only, is that not exactly where the fresh air is wanted? Certainly, but fresh air is not the *only* thing that is wanted in an artisan's house. Warmth and freedom from draughts are only second in importance, if indeed, they are second. There are delicate women and tender babes to be considered, as well as robust men, and our mortality tables painfully remind us of the fact that that consideration is far too much overlooked. No doubt by the passage of a given quantity of air through a room you can make a part fresher than the whole, but it is evident that as you reduce the part affected you necessarily increase the velocity and lower the temperature of the current; indeed, you can, without difficulty, carry this reduction so far that with the aid of a good-going fire, you may obtain a very high standard of purity, and a cold draught of perhaps 150 feet per minute in the only habitable part of the room, that is in the only part where the air is fit to be breathed. Our object of course must be to make every part of a room habitable, and to leave not one stagnant corner in it. In this way alone can we secure in the highest degree both essentials of a healthy dwelling — pure air and warmth. Now, we shall find that the lower the ceiling the more easily can this combination be secured.

Let us look a little more particularly at the superior facilities which the low room offers. The top of the door, from which I think the greater part of the air required should come, is necessarily near the ceiling, and the current will therefore completely disturb the upper stratum of air. The air from the window will have the same effect in a smaller degree, and both currents will be warmed by contact with the ceiling. We need never look to the floor as an air-warmer, except to a limited extent near the fire; a much larger area of the ceiling is heated, and in a low room there is not only a much larger area of ceiling to heat than there is in a high room, but the radiant heat upon it being more intense, it becomes an air-warmer of immensely greater power; and, obviously, this extra power in a low room can be used either to raise the temperature of the room, or to raise a larger supply of air to the same temperature. Besides, if in this way we are able to admit more fresh air near the ceiling, we shall also, in like proportion, be able to reduce inlets at a lower level, and to that extent get rid of cold draughts. Practically, the quantity which can safely be admitted is limited by the means of warming it — the more we can warm, the more we can safely admit. I insist very much on the importance — the absolute necessity — of this heating in connection with the ventilation of small houses. Some people seem to think that hot air and foul air are synonymous terms; it would be much more correct to say that cold air and foul air are synonymous. If we wish the occupants of small houses to admit plenty of fresh air, we must not only convince them that it is good for them; we must show them how to do it without sacrificing something else, which is good also, which is even better in their estimation — namely, comfort.

In conclusion, I desire earnestly to invite the attention of Scotch local authorities to this subject. It is clear that, if I am right in the views I have advanced; if it is the fact that from a sanitary point of view, a low ceiling is as good as a high one — much more if it is better — municipal authorities are utterly wrong when they prevent by legislation (as some have done, and others wish to do) the erection of low-ceilinged houses. It simply comes to this, that by such regulations they wastefully increase the rents which the working classes must pay for house accommodation, and thereby in the most direct manner encourage overcrowding with all its attendant evils: while at the same time they effectually prevent the erection of improved dwellings, such as are now common in London, and elsewhere in England.

THE ILLUSTRATIONS.

SKETCHES AT PERUGIA, ITALY. BY MR. C. HOWARD WALKER, ARCHITECT, BOSTON, MASS.

See article elsewhere in this issue.

INTERIOR OF THE MOSQUE AT CORDOVA, SPAIN; — ENTRANCE TO MONASTERY OF ST. ISABEL, SEVILLE, SPAIN. SKETCHED BY MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

See article elsewhere in this issue.

PLAN OF THE SEWERAGE SYSTEM OF KEENE, N. H.

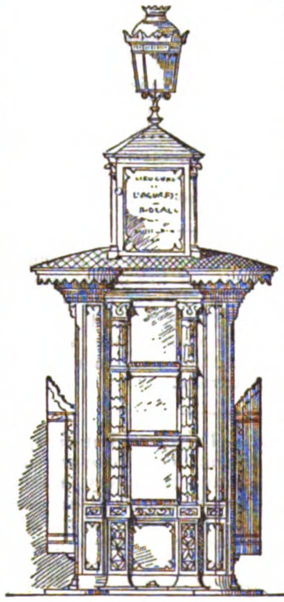
See article elsewhere in this issue.

COMPETITIVE DESIGN FOR BILLINGS HALL, UNIVERSITY OF VERMONT. MESSRS. ROSSITER & WRIGHT, ARCHITECTS, NEW YORK, N. Y.

The authors of this unsuccessful design state that, as the plan embodies no unusual features they have indicated the general arrangement by the lettering at the bottom of the sheet.

SANITARY PLUMBING.[1] — VII.

HOPPER–CLOSETS.



We come now to the class of water-closets which is independent of valves, gates, plungers, or mechanical seals or obstructions of any kind, and which accomplishes both the removal of the wastes and the exclusion of sewer-gas by the simple action of the flushing stream and by the water-seal which it forms.

These closets have received the general name of "hopper-closets." They do their work more effectively and by simpler means, and afford equal or better security against sewer-gas than the complicated machines heretofore described, and must be placed far ahead of them. There is no point in plumbing in which sanitarians are more in accord than in this. But it must be borne in mind that there is the greatest difference in the different kinds of hoppers, and it is to the improved kinds that we refer in our comparison with other closets.

Hopper-closets have usually been classified as "long" and "short" hoppers; *i.e.*, those having the trap above and those having it below the floor-level. The trap should, however, never be placed below the floor except where it is necessary to avoid

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[1] Continued from page 190, No. 408.

the effects of frost, and, as this is a condition which applies equally to all styles of closets, it marks no distinguishing characteristic, and can form no proper basis of classification for any special type.

Abandoning, therefore, this old classification, and adopting for our basis the most important characteristic features of the closet, we make two general divisions and further detailed subdivisions. The general divisions are: —

I. — Those which have *no standing water* in the bowl to receive and deodorize the waste matters and prevent their striking and adhering to dry surfaces. These we may call "dry" hoppers. The water stands only in the trap.

II. — Those whose bowls are formed to retain a *permanent body of water* so that no part of the interior can be soiled by waste matters striking them. These we may call "improved" hoppers.

This latter class is itself subdivided into a number of different kinds, in accordance with which the different principles upon which the flushing streams are employed in emptying and cleansing the closet.

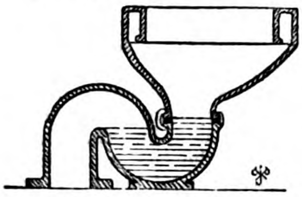


Fig. 9. — Short-Hopper.

I. — "DRY" HOPPERS,

Or those constructed without standing water in the bowl.

Figure 9 represents a water-closet of this class having the trap above the floor, and usually called the "short"-hopper.

Figure 10 represents the same kind of closet with the trap below the floor called the "long"-hopper. It is intended to be used in cold places where the water in the trap can only be protected from frost by burying the trap in the ground. It is sometimes said that the wastes are more easily ejected from the trap of the long-hopper through the greater weight and momentum of the falling water. But what little is gained in this direction is far more than offset by the disadvantage of having an increased dry surface to be fouled above the trap, and as there is no difficulty in ejecting the contents of a trap above the floor when the flushing stream is properly constructed, this form of hopper is most strongly to be condemned. Even where great cold is to be guarded against, it is better to properly pack the trap *above* the floor, than to have a long, foul waste-pipe above the trap. The trap of the long-hopper is so low down as to be practically out of sight, and when unsealed by momentum, as frequently happens, the accident may easily escape discovery.

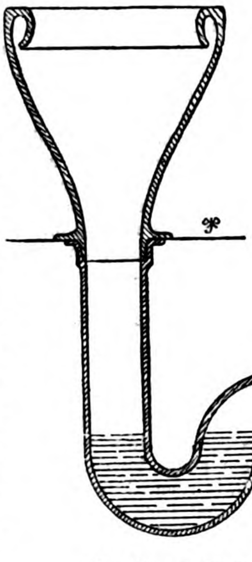


Fig. 10. — Long-Hopper.

It will be seen from the drawings that the surface of the water in the trap of these closets is entirely insufficient in area to receive the wastes, which fall upon the dry sides of the bowl and require constant attention and disagreeable labor to remove them.

On account of this defect dry-hoppers are sold at a low price, and they are bought to save in first cost, under a false idea of economy. *They should never be used*, in the better class of houses because the trouble necessary to keep them clean will not be endured; nor in the poorer class because the trouble will not be taken, and the closet soon becomes a nuisance in the house. Or if, by exception, cleanliness in this direction be insisted upon, the extra labor and consumption of water soon offsets the saving in first cost.

It is easy to see that the water required for cleansing the dry-hopper is very much greater than for the "improved" kind, whether the scouring be done by the strength of the flush or by manual labor, for, as is well known, soil adheres with the greatest tenacity to a dry surface. In view of this fact, dry-hoppers have to be constructed with a copious and powerful flush, and there is a strong temptation for the user and especially for servants having them in charge, to try to remove the tenacious substances by prolonged flushing in order to avoid a disagreeable manual labor. This practice occasions a waste of water far greater than most people imagine.

An effort has been made to overcome this objection by using a valve or cistern constructed to give a small preliminary wash before using. But this complicates both the construction and the operation and adds enough to the first cost to pay for a hopper of proper construction. The preliminary wash, moreover, is often insufficient for the purpose, and is always as far as it goes, wasteful of water.

The dry-hopper has also other serious defects, particularly in its method of connection with the soil-pipe, its flushing, and material. In view of what has already been said touching these points in connection with other closets a simple glance at the drawings and the preceding table of requirements will render this clear without further explanation.

II. — IMPROVED HOPPERS,

Or those having standing water in the bowl, may be subdivided into seven classes, which may be designated as follows: —

(*a*) "*Tilting-Basin*" closet.
(*b*) "*Air-Vacuum*" closet.
(*c*) "*Wash-down*" closet.
(*d*) "*Trap-Jet*" closet.
(*e*) "*Siphon*" closet.
(*f*) "*Wash-out*" closet.
(*g*) "*Self-Sealing*" closet.

(*a*) TILTING-BASIN CLOSET.

Figure 11 represents a water-closet of this class. Its peculiarity consists in having a double bowl, like the Jennings tilting wash-basins. The outer basin is connected with an ordinary S-trap and is stationary. The inner basin is pivoted to tilt after use and empty its contents into the stationary basin, whence they are supposed to pass out into the soil-pipe. The tilting is done by hand. This is a very bad and clumsy arrangement. The stationary bowl corresponds with the receiver of the pan-closet and has its defects. The inner bowl conceals the trap which should be visible; adds greatly to the complexity and cost of the closet without having any advantage; and necessitates a disagreeable manual labor in tilting. No attempt is made in this closet to remedy the defects in the manner and noisiness of flushing, insecure connection with the soil-pipe, improper construction and material which characterize the dry-hopper.

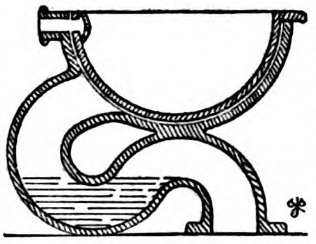


Fig. 11. — "Tilting-Basin" Closet.

(*b*) AIR-VACUUM CLOSET.

Figure 12 represents a water-closet of this class. A double trap is necessary to give the space in which the partial air-vacuum is formed. A cistern and valve of peculiar and complicated construction forms a necessary part of the apparatus, and constitutes the mechanism for producing the vacuum between the two traps. The air is drawn from this space between the traps through an air-pipe connecting with the cistern. Water rushes from the bowl and lower trap to fill the partial vacuum. The two bodies of water unite in the vacuum-chamber, forming a charged siphon which is supposed to empty the bowl; fresh water enters the bowl from the cistern through a second pipe and supplies the place of that which is withdrawn.

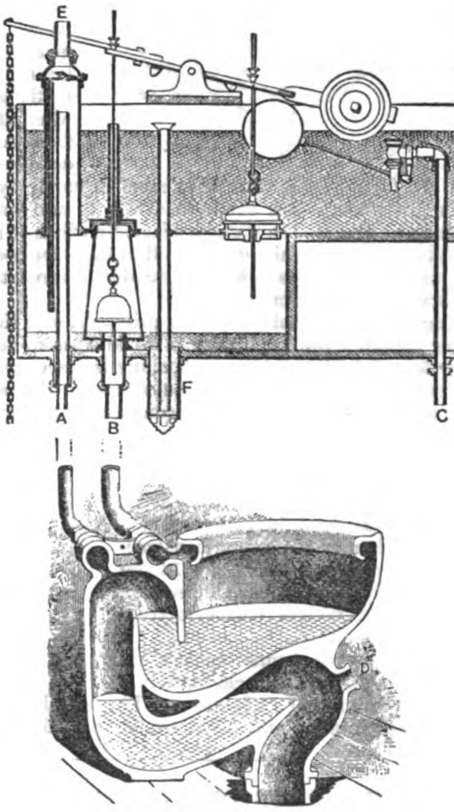


Fig. 12. — "Air-Vacuum" Closet.

The complicated and delicate machinery required to produce the vacuum and to supply and regulate the flush of this closet renders it peculiarly liable to get out of order and difficult to repair. The presence of a double trap is a disadvantage as increasing the cost and requiring a greater quantity of water for their entire cleansing and replenishment. The contents of the lower trap are invisible. The same defects of connection with the soil-pipe, material and construction exist here as in the hoppers already described.

(*c*) "WASH-DOWN" CLOSET.

Figure 13 represents a water-closet of this class. These closets depend for their flushing upon the power of a stream or of streams and separate jets striking the surface of the water standing in the bowl from above. The quantity and surface of the standing water must be small, as otherwise the flushing stream, however powerful and

copious, so applied proves inadequate to the task of ejecting the contents completely from the bowl and trap. The substances floating in the water are tossed and twirled about for some time before they come under the influence of the streams and jets calculated to submerge them. The water "piles up" in the bowl and a great waste is occasioned.

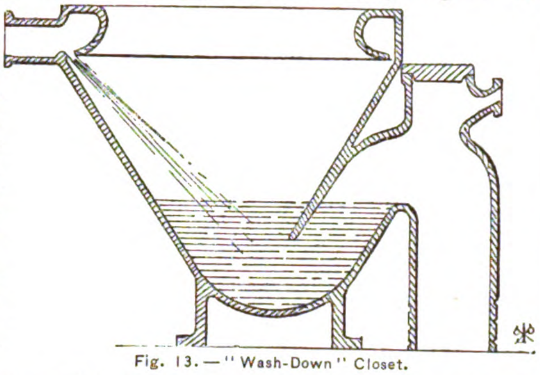


Fig. 13.—"Wash-Down" Closet.

The force of the water is not judiciously applied. When the surface of the water standing in the bowl is large enough to perform its office of receiving the dejections with certainty and thoroughness, their removal, if possible at all, is accomplished only with still greater wastefulness, and the roar of the cataract of water required forms no welcome music for the consumer.

(*d*) TRAP-JET CLOSET.

Figure 14 represents a kind of hopper-closet invented in England about half a century ago. In this closet the flushing stream is applied to much better advantage for emptying the basin and trap than in the preceding. To overcome the inertia of the heavy body of standing water in the bowl and trap, a jet of water is introduced directly into this water below its normal level, and in the direction of its outflow. A given stream or head of water acts far more effectively in communicating motion to an inert mass of liquid, when it enters directly within that body than when it strikes its surface from some point above or outside of it. In the latter case the force of the water is exhausted, partly by friction in passing through the air, which tends to divide it into a spray, and partly by the impact against the water surface, by which it is turned and partly reflected. The remainder of the flushing-stream enters from above in the usual way. The lower jet tends to prevent the "piling up" of the water in the basin.

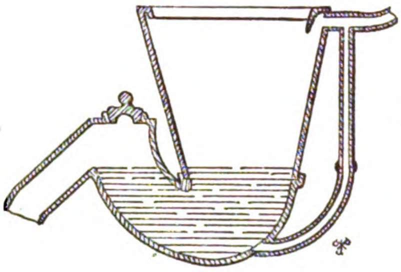


Fig. 14.—"Trap-Jet" Closet.

Excellent as is this closet in principle, and simple in form, it has never attained the popularity it would seem to deserve; but the construction of the jet and upper flushing is susceptible of great improvements; as it is, the complete ejection of the wastes can only be accomplished by using a very strong head and large volume of water; hence, the supply-cistern must be placed very high, and much higher than is usually convenient in private houses, and with some forms of the trap-jet closet used in this country a cistern and valve of peculiar construction are required. In Figure 14 the trap is very deep, square in section and supplied with a clean-out trap-screw at the crown.

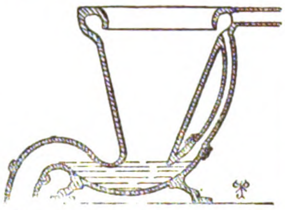


Fig. 15.—"Trap-Jet" Closet.

Figure 15 represents another old form of English trap-jet closet, with a shallow trap, round in section. The standing water in the basin is too small in area, and the closet is not used in this country.

THE SEWERAGE OF THE CITY OF KEENE, N. H.

THE present population of the city of Keene is about eight thousand. Water-works were introduced in the year 1869, although Keene was not incorporated as a city until 1874.

The necessity of sewerage became soon apparent, and action was taken by the City Council in the year 1876 in reference to providing a proper system of sewers for the city. Phineas Ball, of Worcester, was employed to submit recommendations, and his careful and elaborate report was published by the City Council in 1876. It may be well to quote a few figures from this report. Mr. Ball's system provides for the drainage of 1,718 acres, and the following are the total lengths of the various sizes of sewers recommended by him:—

550 feet 40″ x 60″ brick sewer; 739 feet 32″ x 48″ brick sewer.
1,754 " 30″ x 45″ " " 2,872 " 24″ x 36″ " "
1,012 " 22″ x 33″ " " 8,075 " 16″ x 24″ " "
16,000 " 15″, pipe " 19,278 " 12″ pipe "

The cost of this system, although not estimated in the report, would not be far from $150,000. It is evident that the considerations which led to the choice of so large sewers in this system were the admission of storm-water and the slight variations in level, which obtain over a large portion of the city.

Further action in the matter of sewerage was suspended until the year 1882, when the City Council employed Col. George E. Waring, Jr., to devise a system of sewerage similar to that designed by him and now in successful operation in the city of Memphis, Tenn. Col. Waring submitted a plan which provided for the drainage of substantially the same area as that included within the plan of Phineas Ball. In the specification accompanying his plan he states: "The system is arranged for the exclusion of all street, yard, roof and other surface and rain water, and is intended to carry all waste-water discharged from dwelling-houses, manufacturing establishments, etc., and the overflow of all fountains supplied from the city water-works. The system is to be completely flushed at intervals of not more than twenty-four hours, from flush-tanks having a discharging capacity of from one hundred and forty to one hundred and fifty gallons; one of the flush-tanks being located at the head of every branch of the sewers, and connected with the water-supply, so that it will be filled to the discharging level at intervals not greater than twenty-four hours, with appliances for reducing the intervals at the option of the city to six hours. All connecting pipes or drains between the sewers and houses, shops, etc., to be restricted absolutely to a diameter of four inches, and to be laid without a trap, obstruction or contraction, so that their extension through the soil or waste pipe of the house may afford a free channel for ventilation to the open air."

The City Council of the city of Keene passed the following resolution August 21, 1882. "Resolved: That the plan for sewerage submitted by Col. George E. Waring, Jr., be adopted, and a Joint Special Committee on Sewerage be appointed and authorized to make a contract with the Drainage Construction Company, of Boston, or such other parties as they may think best, for laying sewers in various streets as shown on the plan, and in accordance with the specifications submitted by Col. George E. Waring, Jr., and that the sum of $85,000 be raised and appropriated therefor." The plan called for the construction of the following lengths and size of sewers:—

8,800 feet of 15″ sewer; 1,950 feet of 12″ sewer;
1,248 " " 10″ " 530 " " 8″ "
60,520 " " 6″ " all being pipe sewers.

In view of the large territory in which sewerage had become an urgent necessity, and in view of the enormous cost at which even a limited system could be constructed on the plan recommended by Phineas Ball, it seemed to most of the citizens of Keene that the system as derived from Colonel Waring, was the best that could be obtained for an efficient and economical drainage of the city. The level condition of the surface of the basin in which a large amount of sewerage was demanded was a difficulty which any system must contend with in securing adequate grades for the sewers, and to meet this it was thought that by excluding all storm-water from the sewers, and allowing only sewage matter to flow through them, the frequent cleansing which the flush-tanks must give to the pipes would be amply sufficient to overcome this natural objection.

The surface formation in the city of Keene, embraced within the limits for which sewerage is provided, is such as to naturally divide it into two distinct districts, with separate outfalls for the sewers into the Ashuelot River, about three-fourths of a mile from the centre of the city. The districts are designated as the Central and Beaver Brook districts, the former embracing the central and western portions of the city, the latter the eastern section. A considerable portion of the central system is situated on nearly level land, whose elevation does not vary largely from heights of eight and ten feet above the water in the Ashuelot River. North of this level section the land rises gradually until an elevation of sixty feet above the river is attained. The Beaver Brook district is divided nearly in twain by the brook bearing that name, the land sloping upward on either side. The highest elevation of this brook within the sewerage limits is about eleven feet above the Ashuelot River, into which it empties. The location of the main sewers was, therefore, easily determined: the one to follow the general direction of the brook, the other to start from the Central Square and run in a southwesterly direction to the river. By referring to the map (*see Illustrations*), the reader will see the arrangement of the entire system as now completed.

The grade of the 15-inch central main from its outlet in Butler's Court to the Square is on the average about 1 foot in 310 feet. Most of the laterals connecting with the main have grades of over 1 foot in 250, excepting four or five short lines whose grades are generally 1 in 400. The largest grade, however, which could be obtained for the Beaver Brook main was 1 foot in 800 feet; the least for a few hundred feet from the outlet was 1 foot in 1,000 feet. The laterals to this main also have good grades, only a few lines having a grade of 1 foot in 400.

The plan which Col. Waring suggested for overcoming high water in the Ashuelot River (which during any period of heavy rain or thaw often rises from three to six feet above the outlets of the sewers) was to have a jet-pump near each outlet worked from the city water-supply. Whether this will be adequate to secure the desired result

can be determined only by a few years' experience, as no opportunity to test it has as yet been afforded.

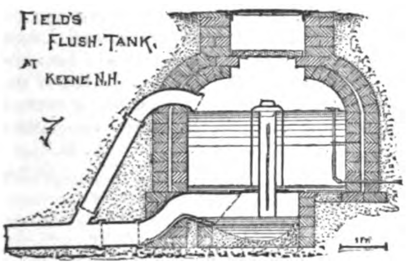
CONSTRUCTION.

Material: — All of the sewers are of the best quality of vitrified pipe, of sizes varying from six to fifteen inches in diameter. The pipe was subjected to rigid inspection, once in the yard and finally at the trench, before laying. The requirements of the inspection were, that they must be free from cracks (slight checks in burning excepted), that they should be perfectly smooth on the inside, straight and of uniform diameter. The kind of pipes used were the Boynton pipe (6-inch), of New Jersey, Akron pipe, Portland pipe, English and Scotch pipes. The following are about the percentage accepted of the different kinds: Boynton, 70 per cent, Akron, 80 per cent, Portland, 85 per cent, English and Scotch, 75 per cent.

Cement:—Most of the cement used was the Hoffman brand of Rosendale cement. Every barrel was tested by what is known as the "ring test," samples being taken from each barrel, mixed into a stiff paste, and allowed to set under water. Samples were accepted if they supported without impression a quarter-pound weight on a wire one-twelfth inch in diameter, within one-half hour of mixing, and all were rejected which failed to support a pound weight on a one-twenty-fourth-inch wire twelve hours after mixing. About five hundred barrels were tested, of which about ten per cent were rejected.

Man-holes: — In Col. Waring's plan only twelve man-holes were provided for the entire system, six on the Beaver Brook main, and six on the central main. We, however, deemed it advisable to increase the number, and man-holes were built at frequent intervals on the main, and at junctions of pipes where they seemed to us necessary. The inverts in the man-holes were formed of half-pipes bedded around and underneath with concrete.

Flush-tanks: — The flush-tanks were built with a uniform capacity of about one hundred and fifty gallons. The accompanying diagram shows the form in which they were constructed in Keene. On account of the severity of the climate it was deemed expedient to have a double brick wall with air-space between. Several tanks were in operation the past winter, and were not affected by the frost, which was several feet deep.



Access to the Sewers: — Two-foot pipes, with loose covers over openings extending about fifteen inches on the top of the pipes (forming hand-holes) furnish the means for access to the six-inch sewers, and are placed at intervals of one hundred feet on the sewer-line. Once in every three hundred feet these are replaced by stand-pipes or lamp-holes, with the vertical six-inch pipe reaching to within two feet of the surface of the ground. In this manner the flow of the current can be observed every three hundred feet, with little difficulty. Wherever curves occurred in the line, "hand-holes" were placed at each end of the curve to afford greater facility in removing any obstruction that might be lodged there.

Trenching: — Many varieties of soil have been encountered in laying the sewers in different portions of the city. In the highest streets the digging was almost wholly in sand with no water, and sufficiently compact in many places to require little or no bracing of the trench. Throughout the central part of the city more or less quicksand was found at depths below six feet. It occurred in three forms: first, as a blue, clayey quicksand; second, like ordinary fine sand readily running in water; and third, as a swampy sand with some mud intermixed. The first was by far the most troublesome, as when softened with water the entire bottom of the trench became yielding and uncertain. Close sheet-piling was used, and a good foundation for the pipe secured by sinking plank scows into the quicksand until a firm bottom was reached. A good method of laying pipe in this kind of trench was to use a square trough, wide enough to receive the pipe, which could thus be laid free of running sand around the joints. Ordinary brick-clay has occurred in many places in which, if softened by water, plank foundations were laid.

Pipe Laying: — To prevent the entrance of cement into the pipes at the joints a band of twisted oakum was pressed between the bell and spigot of the pipes. It was found unadvisable to put cement in the bottom of the bell of the pipe before inserting the spigots. All sizes of pipes were laid on a true grade by the use of the grade-line and rod. Stubs were driven alongside the trench fifty feet or less apart to nearly the surface of the ground, and the distance of the flow-line of the sewer below these given at each station.

Tile Drainage: — As this system excludes all surface or storm water a special care was taken to provide an efficient drainage of the soil by means of drain-tiles. The form of tile most used was round, nearly non-porous, in lengths of two feet, and of sizes varying from one-and-one-fourth inch to three inches. They were laid alongside the sewer-pipe, and at nearly the same grade, the joints being securely wrapped with muslin torn into strips three inches wide, and long enough to go twice around the pipe. Frequent outlet was given them into the sewer by means of running the tile into a pipe, or entering it at a man-hole.

The following statement shows the total amount of sewerage constructed in Keene under the contract of the Drainage Construction Company: —

9,065.55	feet of	15″	pipe	sewer;	3,441	feet of	12″	pipe	sewer.
1,178.5	"	10″	"	"	2,742.5	"	8″	"	"
44,788.5	"	6″	"	"					

Forty-four flush-tanks and fifty-one man-holes have been built. The contract prices per foot of laying the above sizes — all material furnished by the contractors, and work done in accordance with the specifications are as follows: —

For	15″	pipe,	$2.05	per foot.	For each	flush-tank	completed,	$63.00.
"	12″	"	1.61	" "	" "	man-hole	"	40.00.
"	10″	"	1.34	" "	" "	outlet	"	200.00.
"	8″	"	1.06	" "	" "	inlet	"	100.00.
"	6″	"	0.90	" "				

The following additions and deductions were made from the original plan: 365.5 feet 15-inch sewer added; 1,491 feet 12-inch sewer added; 2,212.5 feet 8-inch sewer added; 61.5 feet 10-inch sewer deducted; 14,731 feet 6-inch sewer deducted; 39 man-holes added, and 14 flush-tanks deducted.

The number of families to whom sewerage is now accessible in Keene is 720; it is also accessible to seven manufactories and three hotels. All of the sewers in the city have been thoroughly tested by passing wooden balls through the pipes. These balls were two inches less in diameter than the pipes, and were driven through them by a stream of water from the city water-works. The system is now in satisfactory working order, and connections are being rapidly made by the citizens.

L. M. Muzzey, *Engineer in charge.*

MICROSCOPIC ORGANISMS IN BUILDING MATERIALS.

San Francisco, Cal., August 15, 1883.

To the Editors of the American Architect: —

Dear Sirs, — I have read the article on "Microscopic Organisms in Building Materials" in the *American Architect* for August 4, which came to hand to-day. I enclose an article from the San Francisco *Chronicle*, of recent date, of which I am the author.

> "Having occasion to examine a brick that was taken from an old ruined and forsaken building, which was being torn down, I was somewhat startled upon adjusting a microscope upon a fragment to see each pore of the brick inhabited by a peculiar rod-like animalcule of the genus *bacilli*. These insects cannot be seen except by aid of the microscope, even when they live in the human system and prey upon our vitality, neither are they visible in the soil or substances in which they may live and hive, except through a powerful glass. Their motions when they were agitated by blows were as the links of a chain, reminding one of a system of joints to be extended and contracted. They were semi-transparent, with a light, scintillating column nearly two-thirds their length, extending from near their head to their pointed tails, probably their spinal column. As this brick was from the foundation, and being underground and next to the street sidewalk it illustrates forcibly the fact that, however hard-burned and well-made, porous substances should not be put underground for foundations or sewers. Solid rock, or concrete, or terra-cotta are the only proper building materials below the level of the sidewalks. If we wish a healthful city we must have healthful homes, healthful business houses and healthful apartments. It has been said that the fetid breath of any person disseminates the floating germs of the disease that caused that foul breath, and if so of a person, the same will be true of any porous building material where the dampness of any soil, or subsoil, has sufficient moisture to generate the germs, and there is putrescent matter floating and dropping about continually to keep the germs in active principle. Buildings should have stone foundations where exposed to any possible seepage from any drainage or from sewers."

I have repeatedly examined porous building materials, and in all cases where subject to exposure to human or animal evacuations I have found the organisms mentioned. The *bacilli* are the same that I have seen from human kidneys affected by Bright's disease, and more especially after persons had died, and where uric acid had been very prominent. In one case of Addison's disease an examination indicated the same animalculæ. I have a fondness for the curious, and mere accident caused me to examine a brick, and following up the clew thus obtained I have discovered the same conditions of life to exist in several instances.

Yours truly, W. W. Goodrich.

[Mr. Goodrich stated in conversation that he first made the discovery some six years ago, and therefore his discovery possibly antedates that of M. Parize, which was published in our issue for August 4.— Eds. American Architect.]

BUILDING IN ST. LOUIS.

St. Louis, October 18, 1883.

To the Editors of the American Architect: —

Dear Sirs, — In the *American Architect* for 13th inst. is quoted from the Philadelphia *Bulletin* a comparison of the number of building permits issued in different cities during the year 1882, in which comparison St. Paul, Minn., heads the list with 4,000 permits, Philadelphia follows with 3,334, and New York modestly reports but 1,905.

In such a comparison St. Louis will appear to advantage. The number of permits in 1882 was 2,569, of which 807 were frame buildings, and 1,762 were of brick and stone. The aggregate value of these buildings as gathered from the permits somewhat exceeds eight million dollars.

As the temptation to undervalue is as potent here as elsewhere, the actual value of the buildings erected in 1882 may be roughly estimated at ten million dollars.

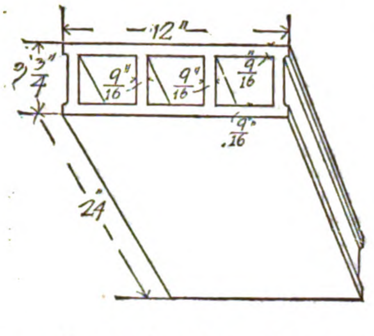
Very respectfully,
C. E. Illsley.

CLAY ROOFING-TILES.

Washington, D. C., September 29, 1883.

To the Editors of the American Architect: —

Dear Sirs,— The iron roof of the new Pension Building at Washington is to be covered under metal with hollow terra-cotta sheathing tiles, 4″ x 12″ x 24″, with three rectangular holes running lengthwise through them. The actual size of specimens tested yesterday are as below: —



With 22-inch clear span the load was applied to a lath 2 inches thick resting across middle of the tile.

No. 1, burnt 2″ clay, broke at 2,394 pounds.

No. 2, two-thirds clay and one-third sawdust, broke at 1,940 pounds.

This is equal to 3,294 pounds per square foot of whole surface of tile thus supported for the tile of pure clay; and 1,940 pounds per square foot for the porous tile, burnt from a mixture of one-third saw dust and two-thirds clay. These tiles are made by the Potomac Terra-cotta Company, and are a sample from a kiln of such tiles made for the new Pension Building.

Such sheathing is cheap, strong and durable, and is a bad conductor of heat; therefore, it is believed to be a valuable roofing material, and if protected from sharp blows of hard substances by a wooden covering may be useful in fire-proof flooring.

Very respectfully, your obedient servant,

M. C. Meigs,

Sup. Architect and Engineer, New Pension Building, U. S. A.

SOIL-PIPES AND LIGHTNING.

Newport, R. I., October 23, 1883.

To the Editors of the American Architect: —

Dear Sirs,— Referring to the question raised by your correspondent, "W," as to danger from lightning in carrying soil-pipes through the roof, I can only say that I have never known of an accident resulting from the present almost universal practice. The top of the soil-pipe is rarely the highest point of the house; it is generally protected by lightning-rods on the roof and chimneys, and it is itself, in all properly-constructed work, continued with iron pipe some distance outside of the foundation-wall, so that, if struck, it would probably carry the electricity into the ground.

Geo. E. Waring, Jr.

Boston, October 23, 1893.

To the Editors of the American Architect: —

Dear Sirs, — I offer the following reply to your correspondent, "W," in your issue of October 6: The protection of houses from lightning is a subject on which but very little new light has been shed since the days of Dr. Franklin. Unfortunately for the householder, the work of applying the protection has fallen into the hands of a class of ignorant and conceited men, who, with their useless patent insulators and glib tongues, try to make up for their want of brains.

The supposed new risks encountered by the use of the modern iron soil-pipes, presenting a mass of metal in vertical lines, with questionable ground-connection for electric currents, have been brought to my notice repeatedly, not by actual electric discharges, but by the fears of householders. I believe these fears to be for the most part groundless, for the following reasons: —

The ground-connection of the soil-pipe is generally a better path for electricity than most of the lightning-rods are provided with in country houses, where no water or gas mains are available. A rain-water tank, if made of wood, as they are invariably in New Orleans and often in other places, is no ground-connection at all for an electric current, for the wood is a non-conductor. If the tank is of brick, and under ground, the case may be a little better, for the brick is then generally water-soaked from the outside, but its water-tight lining of cement is a poor conductor, and thus breaks the continuity, if actually water-tight.

But the soil-pipe is always supposed to discharge into a drain outside of the house, leading in nine cases out of ten, with country houses, to a cesspool which has constant electric connection with the ground. Its sides are open, whether of stone or brick, allowing a continuous flow of water from the drain into the surrounding soil, and however detestable such an arrangement may be for sanitary purposes, it certainly forms a good terminus for a lightning conductor. Water is known to be a good conductor, and there is always a continuous line of water from the metal soil-pipe to the mass of liquid filth which surrounds the cesspool in the pores of the soil. However little water may be flowing through the drain, its bottom is always *wet*, and such a wetted surface is a good conductor, provided its continuity is not broken by dry spots. These are not likely to occur in the inside of a house drain, so long as the house is occupied. The slimy lining of these drains is very tenacious of water, and always continuous.

Your correspondent, "W," is quite right, in my opinion, in objecting to the practice of terminating the upper end of a soil-pipe in a brick flue. Sanitary considerations condemn it, and the public have now generally adopted the practice of extending it through the roof. Such a projecting pipe, whether connected or not with the system of lightning-rods, forms, in my opinion, an additional protection against lightning; but in order to avail ourselves of its efficiency to the greatest degree, it should be so connected, by extending a branch to it from the nearest lightning-rod, when the roof is not covered with metal. If the roof be tinned, and the soil-pipe soldered to it, then the lightning-rods should also be soldered to the tin at some convenient point. Such an arrangement, with the ordinary soaking cesspool, would give the whole system of lightning-rods a better ground-connection, through the soil-pipe and wet drain, than a rain-water tank affords, and as good as any except a well, or a system of gas or iron water mains, which last are the best possible ones.

Edward S. Philbrick.

TO MIX CONCRETE.

Gallatin, Tenn., October 17, 1883.

To the Editors of the American Architect: —

Dear Sirs, — Will you please publish in your journal the ingredients and proportions of each to use in making concrete steps. The lower step (or to be better understood, the carriage step) of my front doorsteps is broken, and I desire to replace it. The composition of this step has in it sharp sand and gravel, much of the latter being larger than a pea. The house I occupy was built in 1825, and there is much of this same concrete used for many purposes, such as immense pillars, doorsteps, cisterns, and the garden walks; and all are in good order; and naturally I desire to replace the step mentioned with something equally as good. The sharp sand and gravel I can get in abundance from a stream close to my house. It will be necessary, I suppose, to have a wooden frame to shape and lay it in. What would be the time the concrete would require to be protected from usage? We rarely have frost in the ground before the latter part of December. Yours respectfully, A. B. C.

[Take one part *fresh* Portland cement (Saylor's American Portland will probably be easiest obtained in good condition) and two parts of the finer portion of the gravel, screened for the purpose. Mix thoroughly in the dry state, turning over and over, until no streaks of the cement powder are visible; then add water enough to make a stiff paste, and stir in quickly a quantity of the coarse ingredients of the gravel, separated by screening and thoroughly washed beforehand, equal to that of the cement and sand paste. Incorporate as thoroughly but rapidly as possible, and place in the box which serves as a mould, ramming gently to be sure that no cavities are left in the mass. Then cover the whole with sand, or with a wooden cover, to prevent the sun and wind from drying the top into dust, and leave as long as possible undisturbed. Six months would not be too long to leave the block to harden, but if that is inconvenient, the process may be artificially hastened by uncovering the concrete at the expiration of three or four weeks and pouring over it, in successive doses, all of a moderately strong solution of silicate of soda that it can be made to absorb. After a thorough saturation with this the block will quickly harden, and can be used in a week or two.

Of the precautions to be observed in this sort of work, the proper mixing is the most important. The incorporation of the dry sand and cement cannot be too thorough and prolonged, as any group of sand-particles not coated with cement will form a fatal flaw in the block. After adding the water, on the contrary, everything must be done as quickly as possible, since the cement begins in a few minutes after wetting to take its initial set, and cannot be afterwards disturbed without permanently destroying its cohesion. The water should therefore be put in all at once, in quantity about equal to the mixed cement and sand, and stirred in immediately; then adding the pebbles, which should not be dusty, and may even with advantage be damp from washing, the whole should be incorporated with quick but well-directed movements, and the mass put into the mould. It is best to grease the mould, and to work the first portions of the concrete with a trowel into the angles, to make sure of sharp arrises.

If there is any danger of frost, the work should be postponed, or if already done, the concrete block in its mould should be buried in sand, as the fresh concrete freezes very easily, and is destroyed as far as the frost penetrates. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Large Organ for the Cathedral of Riga. — An organ which has just been built in Germany is believed to be the largest in existence. It counts 174 registers and is worked automatically by an Otto gas-motor of four-horse power. Its height is 20 metres, its width is 11, and its depth 10. Its largest wooden pipe is 10 metres long and of a cubical capacity of 2,000 litres. The instrument is to be set up in the Cathedral of Riga. For the St. Stephen's Cathedral of Vienna the same builders are soon to construct a still larger organ. The well-known organs of Boston, Ulm, and St. Petersburg were built by the same men.

"Begone about your Business." — An old dial in the Temple, London, bore the curious motto, "Begone about your business." The maker, wishing to know what motto the Benchers required for the dial, sent his lad to ascertain it. The boy applied while the Benchers were dining, and one of them, annoyed at the unseasonable interruption, said, shortly, "Begone about your business." The lad, thinking that this was the desired motto, reported it to his master, and the dial accordingly bore this novel inscription as long as the building upon which it was placed remained.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

286,580. REVERSIBLE LATCH. — Clark E. Billings, Middlesex, Vt.

286,584. WINDOW-FRAME. — William W. Boyington, Highland Park, Ill.

286,597. CHIMNEY-TOP. — Wendelin Faulstich, Belleville, Ill.

286,600. PIPE-TONGS. — Dan P. Foster, Waltham, Mass.

286,610. COMBINED BIT-BRACE AND WASHER-CUTTER. — Isaac W. Heysinger, Philadelphia, Pa.

286,614. DOOR-LOCK. — William D. Hughes, Washington, D. C.

286,621. METHOD OF APPLIANCE FOR CONTROLLING AND PREVENTING FIRES IN BUILDINGS. — William H. Maxwell and J. Milton Stearns, Jr., Brooklyn, N. Y.

286,644. FIRE-ESCAPE. — John D. Seagrave and Eustis R. Fuller, Worcester, Mass.

286,648. HOT-AIR MAGAZINE. — Joseph H. Spurrier, Joplin, Mo.

286,653. WRENCH. — Henry Artemas Thompson, Farmington, Me.

286,683. RATCHET-BRACE.—Joan Chantrell, Bridgeport, Conn.

286,684. SAFETY-APPLIANCE FOR ELEVATORS. — Robert A. Chesebrough, New York, N. Y.

286,714. DOOR-BELL. — Enoch Lawson, San Francisco, Cal.

286,728–729. BRICK-KILN. — Clark D. Page, Rochester, N. Y.

286,746. WASTE-TRAP.—Samuel E. Thomas, Brooklyn, N. Y.

286,760. ELEVATOR. — Emil Bachmann, New York, N. Y.

286,774. DOOR-HANGER. — Caleb Brinton, Chicago, Ill.

286,780. STEAM-RADIATOR. — George Clark, West Troy, N. Y.

286,828. SHUTTER-FASTENER. — Peter Keffer, Redding, Pa.

286,840. BIT-STOCK. — George C. Paine, Boston, Mass.

286,842. WRENCH. — Granville W. Pittman, Keokuk, Iowa.

286,847. PIPE-TONGS. — Henry Rhyn, Cincinnati, O.

286,850. FIRE-ESCAPE. — Albert N. Sande, Chicago, Ill.

286,857. SASH-CORD FASTENER.—Henry Smith, Jr., Baltimore, Md.

286,858. LIQUID PAINT. — Roderick H. Smith, Dunkirk, N. Y.

286,859. FASTENER FOR THE MEETING-RAILS OF SASHES. — Thomas S. Smith, New Haven, Conn.

286,874. WATER-CLOSET. — Louis Waefelaer, Hoboken, N. J.

286,892. BRICK-MACHINE. — William Andrus, Keokuk, Iowa.

286,894. PLANE. — Fortune L. Bailey, Freeport, Ind.

286,909. SASH-HOLDER. — Miles Commander, Elizabeth City, N. C.

286,912. GATE-HANGER. — Charles Daniel, Butler, Mo.

286,913. WRENCH. — Robt. W. Davis, Elmira, N. Y.

286,918. WHITE PIGMENT. — Joseph B. Freeman, White Hart Lane, Tottenham, County of Middlesex, Eng.

286,931. ROLLER SASH-BALANCE. — Robert B. Hugunin, Hartford, Conn.

286,535. DOOR-LATCH. — Frederick J. Lee, Oswego, Kan.

286,951. STENCH-TRAP. — Randolph McBee, Washington, D. C.

286,964. HOLLOW AUGER. — Jas. A. Rodman, Lebanon, Tex.

286,975. GREASE-TRAP. — John Tucker, New York, N. Y.

286,981. FLOOR-JACK. — Joshua H. Williams, East Craftsbury, Vt.

286,884. MOULD FOR GLASS TILES FOR FLOORS, ETC. — Laurin D. Woodworth, Youngstown, O.

10,393 (*Reissue*). APPARATUS FOR DRYING AND SEASONING LUMBER. — John Owen Smith, Jamison, Ala.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report twenty-five permits have been granted, the more important of which are the following: —

Sophia Quantmyer and N. Walpmor, 2 three-st'y brick buildings, n e cor. Washington and Jefferson Sts., fronting e s Washington St.

Jacob Schmidt, two-st'y brick building, rear of 49 Union St., n s, between Druid Hill Ave. and Pennsylvania Ave.

J. E. Thomas, 10 two-st'y brick buildings, s s Cross St., between Dexter and Nanticoke Sts.

Peter J. Miller, 9 three-st'y brick buildings, s s Edmondson Ave., w of Schroeder St.

John McElroy, 3 three-st'y brick buildings, w s Hanover St., n of Fort Avenue.

J. S. Magarity, 2 three-st'y brick buildings, n s Madison St., w of Bond St.

Canton M. E. Church, brick church, s w cor. Dillon and Canton Sts.

John Raumberg, 2 three-st'y brick buildings, e s Belair Ave., s of African Burying Ground.

John McKee, three-st'y brick building, e s Vincent Alley, n of Lexington St.

Chas. Watterscheidt, three-st'y brick building e s Eutaw St., between Saratoga and Clay Sts.

Geo. R. Presstman, 5 two-st'y brick buildings, e s Dawson St., s of Lancaster St.

Jas. D. Hodge, 24 two-st'y brick buildings, w s Stricker St., commencing s e cor. Baker St.

Dr. J. T. King, two-st'y and basement brick building, w s Stockton Alley, s of Harlem Ave.

Boston.

BUILDING PERMITS. — *Brick.* — *Emerson St.*, *Nos.* 7-13, near H St., Ward 14, for Henry Southers, 4 dwells., 18′ x 30′, two-st'y flat; William T. Eaton, builder.

Unnamed St., near Pelham St., Ward 17, for Est. Barney Cory, 4 dwells., 16′ 4″ x 40′ 8″, two-st'y mansard; J. J. McNutt, builder.

Longwood Ave., cor. Huntington Ave., storage, for A. Folsom & Son, 53′ 8″ and 66′ x 90′ and 128′, two-st'y flat; Gottleib Merz, builder.

Commonwealth Ave., near West Chester Park, Ward 22, for Trustees of Park Entrance Lands, 2 dwells., 30′ and 25′ 7″ x 77′, four-st'y flat; G. F. Shepard, builder.

Silver St., *No.* 304, Ward 13, for Francis Jones, dwell., 21′ x 28′, one-st'y mansard; Lyman Locke, builder.

Silver St., *No.* 302, Ward 13, for Thomas Leavitt, dwell., 21′ x 28′, one-st'y mansard; Lyman Locke, builder.

Columbus Ave., *Nos.* 162-172, Ward 11, for Carter, Dinsmore & Co., store and factory, 66′ x 100′, five-st'y flat.

Wood. — *Lewis St.*, *Nos.* 64-66, cor. Magazine St., Ward 2, for Mary McDavitt, dwell. and store, 25′ x 35′, two-st'y flat; A. & J. McLaren, builders.

Whitney St., near Conant St., Ward 22, for Michael Griffin, dwell., 24′ x 39′ 3″, three-st'y hip; T. O. Grady, builder.

Harvard St., rear, near Brighton Ave., Ward 25, for Gideon P. Brown, greenhouse, 16′ x 64′, one-st'y pitch; C. B. Bowers, builder.

North Beacon St., cor. Everett St., Ward 25, for Mrs. Sarah W. Whitney, dwell., 34′ x 35′, two-st'y pitch.

Congress St., near A St., Ward 13, for James & Abbott, 3 lumber sheds, one, 16′ x 175′; one, 16′ x 75′; one, 16′ x 100′, one st'y flat; Clark & Lee, builders.

Brown Ave., near Allen St., Ward 23, for John H. Apel, dwell., 30′ x 35′; two-st'y pitch; W. S. Mitchell, builder.

Brown Ave., near Allen St., Ward 23, for Theodore Schmitt, dwell., 30′ x 35′, two-st'y.

Saratoga St., near Moore St., Ward 1, for John J. O'Donnell, store, 20′ x 30′, one-st'y flat; Edward Turner, builder.

Saratoga St., cor. Moore St., Ward 1, for William Harrington, store, 22′ x 50′, two-st'y flat.

Lexington Ave., rear, near Union St., Ward 25, for John Behan, storage, 13′ x 40′, one-st'y flat.

Gilbert St., near Centre St., Ward 23, for Owen Nawn, dwell., 26′ x 35′, three-st'y flat; Owen Nawn, builder.

Rutherford Ave., rear opp. Dunstable St., Ward 4, for Eastern R. R. Co., repair shop, 18′ x 40′, one-st'y flat; H. Bissell, builder.

Baker St., near Spring St., Ward 23, for Stephen McNeil, dwell., 24′ x 30′, two-st'y hip; Stephen McNeil, builder.

Union Ave., rear, near Green St., Ward 23, for Maria Roan, 2 dwells., 17′ 5″ x 28′, two-st'y pitch; T. C. Cangley, builder.

Beech St., rear, near Washington St., Ward 23, for Conrad Etter, stable, 16′ x 24′, one-st'y pitch.

West First St., *No.* 172, near B St., Ward 13, for A. P. Morse, stable, 31′ x 42′, two-st'y flat; Clark & Lee, builders.

Saratoga St., *No.* 629, Ward 1, for Mary Hardman, dwell., 22′ x 30′, two-st'y flat; W. Goodwin, builder.

Western Ave., near Waverley St., Ward 25, for James A. Hathaway, 6 dwells., 13′ 3″ x 18′ and 20′ x 30′, two-st'y pitch; B. Wood, builder.

Wakulla St., cor. Rockland St., Ward 21, for J. V. N. Stults, and H. W. Mansur, dwell., 26′ and 36′ x 45′, three-st'y flat.

Boylston Ave., near Porter St., Ward 23, for A. Schuman, dwell., 30′ x 36′, two-st'y pitch; Jacob Luippold, builder.

Summer St., *No.* 34, Ward 3, for John R. Murphy, dwell., 20′ 6″ x 28′, three-st'y flat; Donovan & Brock, builders.

North Beacon St., cor. Everett St., Ward 25, for Albert T. Sinclair, dwell., 24′ 6″ x 34′ 8″, two-st'y pitch; Stephen Ellis, builder.

Hancock St., near Garden St., Ward 23, for Ferdinand Schmidt, dwell., 22′ x 30′, two-st'y pitch; W. S. Mitchell, builder.

Meehan St., near Washington St., Ward 23, for Pat. Crosby, dwell., 19′ and 26′ x 30′, two-st'y pitch; John Gately, builder.

Erie Ave., near Elmo St., Ward 24, for John H. Gigie, dwell., 20′ x 35′ 6″, two-st'y pitch.

Laurel St., near Ottawa St., Ward 21, for Andrew Anderson, dwell., 30′ x 57′, three-st'y flat; Andrew Anderson, builder.

Laurel St., near Ottawa St., Ward 21, for Andrew Anderson, dwell., 27′ 3″ x 51′ 6″, three-st'y flat; Andrew Anderson, builder.

Pickering Pl., *Nos.* 1-4, Ward 14, for Lyman Locke, 4 dwells., 20′ x 30′, two-st'y flat; Lyman Locke, builder.

Brooklyn.

BUILDING PERMITS. — *Van Buren St.*, n s, 90′ e B'way, 4 two-st'y and basement frame dwells., tin roofs; cost, each, $2,000; owner, architect and builder, Samuel H. Yost, 116 Palmetto St.; mason, A. A. Fordon.

Broadway, s e cor. Lafayette Ave., three-st'y frame store and tenement, tin roof; cost, $5,000; owner, Joseph Lawson, 162 South Third St.; architect, T. Engelhardt; builders, A. Sachs and J. Frisse.

Elm St., s e cor. Evergreen Ave., three-st'y frame store and tenement, tin roof; cost, $4,000; owner, Wm. Walsh; architect, F. Holmberg; carpenter, P. Schell.

Hancock St., s s, 140′ w Tompkins Ave., 4 two-st'y and basement dwells., tin roofs; cost, each, $5,500; owner, Robert Little, Willis Ave., New York City; builder, Chas. H. Fenton.

Nostrand Ave., s w cor. Jefferson St., four-st'y brownstone store and tenement, tin roof, wooden cornice; cost, $14,000; owners, Charles Gerken & Bro., Third Ave., cor. Pacific St.; builder, James Powell.

Marcy Ave., n w cor. Monroe St., three-st'y brownstone front dwell. and one-and-one-half-st'y brick stable, tin roofs; cost, total, $8,000; owner, Wm. Richter, on premises; architect and builder, John Brown.

Herkimer St., s w cor. Suydam Pl., 3 two-st'y frame dwells., tin roofs; cost, each, $2,500; owner and builder, S. I. Jarvis, 802 Herkimer St.; architect, A. Hill.

Chauncey St., n s, 350′ e Patchen Ave., 2 three-st'y frame tenements, tin roofs; cost, each, $4,000; owner and architect, Joseph Smyth, 417 Second St., E. D.; builder, Phillip Sullivan.

South Portland Ave., w s, 100′ n Hanson Pl., two-st'y brick stable, tin roof; cost, $6,000; owner, Thos. R. Ball, 15 South Oxford St.; architect, W. A. Mundell; builders, Cornelius Cameron and Wright & Brook.

Withers St., s s, 140′ e Humboldt St., three-st'y frame double tenement, tin roof; cost, $4,000; owner, Hoffman; builder, J. Rueger.

Bleecker St., n s, 200′ e Bushwick Ave., two-st'y frame tenement, tin roof; cost, $3,900; owner, F. Haase, Lorimer St., cor. Ainslie St.; builder, Jno. Rueger.

Stanhope St., n s, 150′ w Central Ave., 4 two-st'y frame dwells., tin roofs; cost, each, $1,200; owner, architect and builder, Henry C. Bauer, 721 Bushwick Ave.

Willoughby Ave., s s, 80′ w Steuben St., 2 four-st'y brownstone front tenements, felt and gravel roofs; cost, each, $6,000; owner, Geo. W. Brown, 728 Fulton St.; builder, L. E. Brown.

Macdonough St., s s, 425′ w Reid Ave., 3 two-st'y brownstone front dwells., gravel or tin roofs; cost, each, $5,000; owner, Geo. Adams, 961 Broadway, E. D.; architect, R. H. Heasman.

Ralph St., n s, 100′ w Evergreen Ave., two-st'y frame tenement, tin roof; cost, $2,500; owner, P. G. Menahan, 791 Bushwick Ave.; architect, F. Weber; builder, Thos. Goodwin.

Broadway, s w cor. Bartlett St., four-st'y iron and brick front store and warehouse, tin roof, iron cornice; cost, $17,500; owner, J. Reinhart, Broadway, cor. Bartlett St.; architect, A. Herbert.

Eleventh St., e s, 40′ w Seventh Ave., 3 two-st'y brownstone front dwells., tin roofs; cost, each, $3,200; owner, Samuel Squires, Fourteenth St., between Fourth and Fifth Aves.; builder, C. B. Sheldon.

Buffalo Ave., w s, 90′ s Herkimer St., 7 buildings, and Herkimer St., s w cor. Buffalo Ave., 21 buildings, in all 28 two-st'y frame dwells., tin roofs; cost, each, $1,500: owner, architect and builder, C. P. Skelton, 1909 Atlantic Ave.

Hamilton Ave., e s, 90′ n Luqueer St., two-st'y brick store and dwell., felt and gravel roof; cost, $3,000; owner and builder, J. F. Nelson, 26 Manhasset Pl.

Pulaski St., n s, 100′ w Stuyvesant Ave., 4 two-st'y frame tenements, tin roofs; cost, each, $3,000, owner, Hon. Chas. Naeher, Meserole St.; architect, F. Holmberg.

Stuyvesant Ave., n w cor. Pulaski St., three-st'y frame dwell., peak roof, slated; cost, $6,000; owner, Hon. Chas. Naeher, Meserole St,; architect, F. Holmberg; builders, not selected.

Vernon Ave., n s, 85′ w Sumner Ave., 2 two-st'y brownstone front dwells., tin roofs; cost, each, $4,000; owner, John Langie, Willoughby Ave., near Sumner Ave.; architect, A. Hill; builder, S. C. Phillips.

Halsey St., n s, 510′ e Bedford Ave., three-st'y brownstone front dwell., tin roof; cost, $9,000; owner, Sarah M. Covel, 234 Cumberland St.; architect and builder, F. B. Jackson.

ALTERATION. — *Smith St.*, s e cor. Schermerhorn St., new stairs on Schermerhorn St., new stairs and entrance on Smith St., interior alterations, etc.; cost, $10,000; owner, Brooklyn Saengerbund, on premises; architect, Carl F. Eisenach.

Chicago.

CHURCH. — Dixon & Townsend are architects for St. John's Reformed Episcopal Church, to be built on Langley Ave.

FACTORIES. — Treat & Foltz, architects, have completed plans for the factory to be built on South Jefferson St., for M. Benner: cost, $28,000.

W. W. Boyington is architect for the factory to be built at 51 South Jefferson St., 72′ x 120′, four-st'y; cost, $16,000; owner, M. Laflin; builders W. & A. Wells.

H. R. Wilson is architect for Mrs. N. Allen's four-st'y factory, on Carroll Ave.; cost, $8,500.

HOUSES. — Burnham & Root, architects, have plans completed for dwell. for A. A. Sprague, on Prairie Ave.; cost, $40,000.

S. Guy Sea will build a two-st'y dwell. in the North Division; cost, $25,000.

A. Fiedler is architect for the two-st'y dwell. to be built for Dr. T. J. Bluthardt, on Lasalle Ave.; cost, $12,000.

L. G. Halberg, architect, made the plans for two-st'y dwell. for Mrs. Williams, on South Park Ave.; cost, $12,000.

Louis Wolff is architect for the four dwells. to be built on Lexington St., for F. Madlener; cost, $12,000.

Furst & Rudolph, architects, made the plans for J. Heissler's three-st'y dwell. and store on State St.; cost, $10,000.

WAREHOUSE. — Geo. E. Edbrooke is architect for the seven-st'y warehouse, 160′ x 187′, on North Clark St., cor. River St., for Hiram Sibley; cost, $500,000.

BUILDING PERMITS. — M. Hearn, two-st'y store and dwell., 765 Indiana St.; cost, $4,000.

F. Brun, two-st'y flats, 101 Hulbert St.; cost, $3,000.

Mrs. N. Allen, four-st'y factory, 665 Carroll Ave.; cost, $8,500; architect, H. R. Wilson.

A. A. Sprague, two-st'y dwell., 2708 Prairie Ave.; cost, $10,000; architects, Burnham & Root; builder, Thos. Nicholson.

J. Heissler, three-st'y dwell. and store, 3444 State St.; cost, $10,000; architects, Furst & Rudolph.

M. Laflin, four-st'y factory, 51 South Jefferson St.; cost, $16,000; architect, W. W. Boyington; builders, W. & A. Wells.

Rick & Sauder, three-st'y flats, 159 Fremont St.; cost, $4,000.

F. Madlener, 4 two-st'y dwells., 3 to 9 Lexington St.; cost, $12,000; architect, Louis Wolff.

David Walker, two-st'y dwell., 311 Robey St.; cost, $3,000.

J. W. Kindt, two-st'y dwell., 292 Lincoln Ave.; cost, $5,000.

Geo. W. Wilson, three-st'y dwell., 289 West Ohio St.; cost, $5,000.

S. Guy Sea, two-st'y dwell., 203 and 205 Rush St.; cost, $25,000.

Hiram Sibley, seven-st'y warehouse, North Clark St., cor. River St.; cost, $500,000; architect, Geo. E. Edbrooke; builders, W. A. Wells & Son.

J. Clifford, three-st'y store and flats, 351 East Division St.; cost, $6,006; architect, H. Hanson.

Mrs. Williams, two-st'y dwell., 3426 and 3428 South Park Ave.; cost, $12,000; architect, L. G. Halberg.

S. Bates, three-st'y addition, 131 Fourth Ave.; cost, $3,500.

Mrs. B. S. McVoy, three-st'y dwell., 440 Lasalle Ave.; cost, $8,000; architect, M. L. Beers.

Mrs. M. C. Dobbins, factory, 267 and 269 Twentieth St.; cost, $4,000.

M. Bedner, four-st'y factory, 260 to 264 South Jefferson St.; cost, $28,000; architects, Treat & Foltz; builder, E. Earnshaw.

John McMillan, two-st'y flats, 440 South Oakly St.; cost, $3,000.

John Lyberg, three-st'y flats, 271 Wells St.; cost, $5,000; architect, John Otter; builder, C. Lind.

John Jansen, 5 cottages, Oakly St., near Frankfort St.; cost, $5,000.

J. J. Schock, two-st'y dwell., 1527 West Madison St.; cost, $5,000.

C. Binefeld, two-st'y dwell., 102 Rees St; cost, $3,000; builder, M. Kuehl.

R. Porter, 2 two-st'y dwells., 3747 and 3749 Lake Ave.; cost, $9,000.

St. John's Reformed Episcopal Church, one-st'y church, 3702 Langley Ave.; cost, $6,000; architects, Dixon & Townsend.

Peter McDonald, 2 two-st'y flats, 540 and 542 Leavitt St.; cost, $5,000; architect, C. C. Miller.

Thos. Morse, 2 two-st'y flats, 622 to 626 Twenty-seventh St.; cost, $5,000; builders, Smith & Goebel.

Wm. Hill, three-st'y dwell., 371 Twenty-third St.; cost, $3,000; architect and builder, S. P. Russell.

John Fritz, two-st'y and basement flats, 3609 Forest Ave.; cost, $4,000.

C. Woelfler, dwell., 758 North Park St.; cost, $8,000; architect, Theo. Karls; builders, Riplinger & Son.

Dr. T. J. Bluthardt, two-st'y and basement dwell., 453 Lasalle Ave.; cost, $12,000; architect, A. Fiedler; builder, Jno. Cox.

Cincinnati.

STORE. — A store 49' x 120' is to be built on Fourth St., bet. Vine and Walnut Sts., five-st'y; the building will be occupied by John Church & Co., dealers in musical instruments; Mr. Samuel Hannaford, architect.

STABLES. — The C. Moerlein Brewing Company are to build a new stable on the cor. of Henry and Dunlap Sts., 100' on each street, four-st'y and basement; cost, $25,000; architect, Geo. W. Rapp. Mr. Rapp has also prepared plans for a frame stable for Mr. Thos. Pogue on Nassau St., Walnut Hills; cost, $1,000.

New York.

APARTMENT-HOUSES. — For Mr. De Lancey Nicoll a five-st'y apartment-house, 25' x 41' 9", is to be built on the n e cor. of Broadway and Forty-ninth St., from designs of Mr. Jas. Brown Lord.

On the n e cor. of Second Ave. and Ninety-second St., a five-st'y brownstone apartment-house, 25' x 90', is to be built by Mr. Hugo Gorsch, from designs of Mr. Wm. Graul.

A four-st'y flat house, 20' x 51', is to be built by the Trustees of St. Patrick's Cathedral, at No. 276 Mulberry St., from designs of Mr. James E. Ware.

On the s. s of Thirtieth St., 100' e of Eleventh Ave., six-st'y tenement, 28' 11" x 84' 4", is to be built for Rosalie Steinhardt, from designs of Mr. Geo. B. Pelham.

BREWERY. — Mr. L. Levi will build, on the n s of Seventy-first St., 200' w of First Ave., on the rear premises, a distillery, brewery and stable, to cost over $150,000.

EXCHANGE. — Mr. H. K. Thurber and four others have been appointed a committee to take charge of the erection of a new building for the Mercantile Exchange.

FACTORY. — A five-st'y brick factory, 25' x 100', is to be built on the n e cor. of Sixty-fourth St. and Second Ave., for Mr. Henry C. Meyers, of Syracuse, from designs of Mr. J. H. Valentine; cost, about $30,000.

BUILDING PERMITS. — *Jacob St., No.* 25, five-st'y brick store, tin roof; cost, $12,000; owner, Estate of Henry Mangels, A. M. Mangels, executor, 185 Washington Park, Brooklyn; architect, Wm. B. Tubby.

Washington St., No. 79, five-st'y brick tenement, tin roof; cost, $10,000; owner, Isabella V. Hogan, 35 West One Hundred and Nineteenth St.; architect, A. Spence.

Union St., n w cor. Wolf St., 3 three-st'y frame tenements, tin roofs; cost, $4,000; owner, John Spellman, Highbridge; architect, John E. Kerby.

Kingsbridge Road, s s, 100' s N. Y. C. & H. R. R. Co. track, 3 three-st'y brick dwells., tin roofs; cost, $1,800; owner, Isaac G. Johnston, Spuyten Duyvel; architect, Ed. A. Quick; builders, J. & G. Stewart and S. F. Quick.

West Twenty-sixth St., Nos. 505 *and* 507, 2 four-st'y brick tenements, tin roofs; cost, each, $8,000; owner, James Moore, Tenth Ave., between Sixtieth and Sixty-first Sts.; architect, Jos. M. Dunn; builders, Van Dolsen & Arnott and John Smith.

Eleventh Ave., s w cor. Fifty-ninth St., one-st'y brick slaughter-house and one-st'y brick storage-house, gravel roofs: owner, Timothy C. Eastman, No. 6 East Seventieth St.; architect, J. E. Terhune.

One Hundred and Nineteenth St., s s, 215' e Fourth Ave., five-st'y brick tenement, tin roof; cost, $16,000; owner and architect, R. Rosenstock, 209 East One Hundred and Twenty-seventh St.

Courtland Ave., w s, 59' n One Hundred and Fiftieth St., three-st'y frame tenement, tin roof; cost, $4,500; owner, Louis Mitschel, Courtland Ave., between One Hundred and Forty-eighth and One Hundred and Forty-ninth Sts.; architect, Adolph Pfeifer; builder, not selected.

Seventy-sixth St., s s, 199' 4" e Madison Ave., 6 four-st'y brownstone front dwells., tin roof; cost, each, $3,000; owner, Chas. L. Guilleaume, 22 West Eleventh St.; architects, Thom & Wilson.

Lexington Ave., n w cor. Forty-fifth St., 7 four-st'y brick dwells., tin roofs; cost, total, $150,000; owner, Thos. B. Gilford, 473 Lexington Ave.; architects and builders, Chas. Graham & Sons.

Forty-fifth St., n s, 211' w Lexington Ave., five-st'y brick flat, tin roof; cost, $52,000; owner, architects and builders, same as last.

Kingsbridge Road, w s, 1000' n N. Y. C. & H. R. R., two-st'y frame dwell., tin roof; cost, $3,000; owner, Albert E. Putnam, Kingsbridge; architect and builder, Samuel L. Berrian.

East Twenty-ninth St., No. 226, five-st'y brick flat; tin roof; cost, $20,000; owner, Teresa C. Burke, 226 East Thirty-ninth St.; architects, Babcock & McAvoy.

East Seventeenth St., Nos. 531, 533 *and* 535, 3 five-st'y brick tenements, tin roofs; cost, each, $13,500; owner, Thomas E. Tripler, 233 East Eighteenth St.; architect, F. W. Klemt.

West Sixtieth St., No. 217, five-st'y brick flat, tin roof; cost, $20,000; owner, Julia Mullaly, 211 West Sixtieth St.; architect, C. F. Ridder, Jr.

One Hundred and Fiftieth St., s s, 500' w Courtland Ave., three-st'y brick dwell., tin roof; cost, $3,000; owner and builder, John C. Cooley, 547 One Hundred and Fiftieth St.

Prescott Ave., e s, 1120' North Bolton Rd., two-st'y frame dwell., shingle roof; cost, $3,000; owner, Henry P. Carlson, Inwood; builders, S. B. Smith, and Emory & Forsyth.

Ludlow St., No. 87, five-st'y brick tenement and store, tin roof; cost, $14,000; owner, Johanna Noelke, 311 Fourth St., Jersey City, architect, Wm. Graul.

One Hundred and Seventeenth St., n s, 250' e Second Ave., brick tenement and store, tin roof; cost, $18,000 owner, Eugene T. Twigg, 1850 Lexington Ave.; architect, Elbert D. Howes.

ALTERATIONS. — *Courtland St., No.* 31, repair damage by fire; cost, $4,100; owner, Union Theo. Seminary, E. M. Kingsley, Treasurer, 30 Clinton Pl.; builder, Henry Wallace.

Fulton Market Block, bounded by South, Fulton, Front and Beekman Sts., sheds around the building; cost, $5,500; owner, City of New York; architect, Douglas Smith.

Philadelphia.

HOUSES. — *Wyncoop St.*, cor. Sycamore St., Jno. Dignan, Esq., will build 20 three-st'y dwells., from plans by Hazlehurst & Huckel, architects.

WAREHOUSE. — J. B. Stevenson, Jr., is building a five-st'y warehouse, 43' 8" x 120' 8", at the junction of Pennsylvania R. R. and Reading R. R. (or Trenton Ave.); plans by Hazlehurst & Huckel, architects.

BUILDING PERMITS. — *Jefferson St.*, between Main and Lena Sts., 4 two-st'y dwells., 14' x 40'; J. D. Caldwell, contractor.

Vine St., No. 2049, three-st'y addition to factory, 32' x 60'; A. B. Levis, contractor.

Philip St., n of Cumberland St., five-st'y factory, 30' x 43'; S. Humphries, contractor.

Duncan St., cor. Stiles St., two-st'y dwell., 17' x 20'; Andrew Hughes.

Palethorp St., cor. Cambria St., one-st'y chemical building, 16' x 40'; Thos. Old.

Twenty-second St., cor. Henrietta St., hospital-building, 22' x 64'; Watson Rose, contractor.

Germantown Ave., Nos. 2547 *and* 2549, two-st'y carriage factory, 37' x 66'; J. S. Gerhard, owner.

Tenth St.; cor. Dudley St., 2 two-st'y dwells., 15' x 42'; Andrew Miller, owner.

Forty-sixth St., e of Lancaster Ave., two-st'y dwell., 16' x 46'; B. Boyle, owner.

Thirty-first St., n of Jefferson St., three-st'y dwell., 30' x 30'; J. Bloechlinger, contractor.

Tioga St., above Eighteenth St., Sunday-school building, 35' x 45'; Benj. Walton, contractor.

Lawrence St., n of Cumberland St., two-st'y store and dwell., 20' x 65'; Jno. Cairns, contractor.

Ninth St., cor. McKean St., three-st'y factory, 50' x 100'; Burt Bros., owners.

Germantown Ave., cor. Berks St., three-st'y store and dwell., 20' x 65'; J. S. Shea, contractor.

Thirty-first St., cor. Jefferson St., boiler-house, 36' x 40'; F. A. Poth, owner.

Merrine St., cor. Cambria St., two-st'y factory, 26' x 76'; Shegog & Quigley, contractors.

Leverington St., bet. Webster and Clay Sts., 3 three-st'y dwells., 14' x 32'; S. S. Keely, contractor.

St. John St., No. 495, three-st'y dwell., 16' x 32'; Jno. Berner, contractor.

Washington St., n of Ripka Ave., three-st'y dwell., 16' x 20'; W. R. Davis, contractor.

Tenth St., s of Ontario St., two-st'y dwell., 18' x 30'; C. Wilkey, contractor.

Thirty-first St., n w cor. Master St., three-st'y ice-house, 50' x 100'; Jno. Kramer, contractor.

Fifteenth St., n of Columbia Ave., 2 three-st'y dwells., 18 x 70'; J. S. Albright, owner.

Tenth St., cor. Erie Ave., two-st'y storehouse, 30' x 70'; Chas. L. Loney, contractor.

Manayunk Ave., cor. Adams St., 4 two-st'y dwells., 14' x 30'; Jas. Harper.

Ripka Ave., cor. Mansion St., two-st'y stable, 18' x 36'; Jno. Benner.

Hutchinson St., n of Lehigh Ave., two-st'y stable and carriage-house, 16' x 49'; Lewis Walter, contractor.

Third St., n of Cumberland St., two-st'y addition to factory, 35' x 48'; H. French, owner.

Reese St., n of Susquehanna Ave., two-st'y dwell. 16' x 39'; D. C. Schuler, contractor.

Queen St., Nos. 32 *and* 34, third-st'y addition to factory, 42' x 87'; Watson & Robinson, owners.

Woodland St., w of Fifty-fifth St., two-st'y dwell., 18' x 45'; Wm. Bunch, Jr.

Wissahickon Station, Philadelphia & Reading R.R., three-st'y factory, 40' x 150'; Jno. Wilde & Bro.

Highland Ave., cor. Main St. (Chestnut Hill), two-st'y stable, 60' x 62'; McLeod & Loughery, owners.

Columbia Ave., between Fifth and Randolph Sts., two-st'y office, 40' x 55'; Jas. McCartney, contractor.

Adams St., e of Kensington Ave., box factory, 40' x 150'; Wm. Schoenleber.

Clearfield St., n s, w of Frankford Road, two-st'y dwell., 14' x 37'; Duryea & Childs, contractors.

Leithgow St., Nos. 2209 *and* 2211, two-st'y stable, 27' x 32'; Schultz & Gorman, contractors.

Berks St., w of Germantown Ave., 2 three-st'y dwells., 17' x 44', and 3 two-st'y dwells., 16' x 44'; Brockelhurst & Ewing, contractors.

St. Louis.

BUILDING PERMITS. — One hundred and sixty permits have been issued since our last report, forty-nine of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

Dr. E. Chase, two-st'y brick dwell.; cost, $4,800; C. B. Clark, architect; R. Shimmick, contractor.

Thos. J. Walsh, two-st'y brick dwell.; cost, $2,500; T. Walsh, architect; J. P. Gillick, contractor.

Christina Winkelmeyer, two-st'y brick dwell.; cost, $3,000; G. M. Theobolt, contractor.

C. H. Peck, three-st'y brick dwell.; cost, $8,000; C. H. Peck, architect and builder.

M. Dwyer, two-st'y brick dwell; cost, $2,500; I. W. Lister, contractor.

Meyer & Stratman, three-st'y brick livery stable; cost, $10,000; E. Thomson, contractor.

H. W. Beck, one-st'y brick warehouse; cost, $2,600; F. C. Bonsack, contractor.

St. Louis Mutual House-Building Co., No. 3, two-st'y brick dwell.; cost, $3,825; Mortimer, architect; Kaiser, contractor.

St. Louis Mutual House-Building Co., No. 3, two-st'y brick dwell.; cost, $6,000; Mortimer, architect; F. Gruene, contractor.

A. Eichele, 3 adjacent two-st'y dwells.; cost, $15,000; Grable, architect; A. Uhri, contractor.

Mrs. A. A. Blair, two-st'y brick dwell.; cost, $2,500; Grable, architect; T. Murphy, contractor.

Theo. Beyert, two-st'y brick dwell.; cost, $3,750; H. W. Kirchuer, architect; H. Nagel, contractor.

C. Günter, two-st'y brick dwell.; cost, $3,000; Schultman & Gross, contractors.

Calvin Burns, three-st'y brick dwell.; cost, $6,000; Taylor, architect; Kergin Bros., contractors.

L. Sicher, two-st'y brick dwell.; cost, $4,000; Beinke, architect; Hemminghaus & Vollner, contractors.

Norman Brown, two-st'y brick dwell.; cost, $6,000; Simmons, architect; F. G. Gorman, contractor.

John U. Musick, two-st'y brick dwell., cost, $4,000; C. Etts, contractor.

Anheuser-Busch Brewing Association, one-st'y brick wash-and-boiler-house; cost, $7,000; E. Jungenfeld, architect: sub-let.

Anheuser-Busch Brewing Association, one-st'y brick wash-house; cost, $8,000; E. Jungenfeld, architect.

St. Louis University, basement of church building; cost, $30,000; Thos. Walsh, architect; sub-let.

Mrs. L. N. S. Ames, two-st'y brick dwell.; cost, $2,500; Geo. Green, contractor.

Pat. Mulligan, two-st'y brick dwell.; cost, $2,700; Geo. M. Roeder, contractor.

Geo. M. Munger, two-st'y brick store; cost, $15,000; H. W. Kirchner, architect.

Mrs. Harriet Pullis, 3 adjacent two-st'y brick dwells.; cost, $12,000; F. Weston, architect; Cramer & Co., contractors.

H. L. Fox, two-st'y brick store; cost, $10,000; J. W. Barnes & Co., contractors.

Henry Shaw, six-st'y brick store; cost, $4,500; Geo. J. Burnet & Son, architects; S. H. Hoffman, contractor.

St. Louis Mutual House Building Co., No. 3, two-st'y brick dwell.; cost, $6,300; E. Mortimer, architect; A. McKechnie, contractor.

Washington, D. C.

BUILDING PERMITS. — Only the following permits for new buildings costing $3,000 have been issued since last report: —

Virginia Ave., cor. Ninth St., s w, 8 two-st'y brick dwells., for A. W. Barker; cost, $30,000.

Fourth St., between East Capitol and South A Sts., two-st'y brick dwell. for Mr. Burrows; cost, $4,000; J. H. Edelin, builder.

G St., between Sixth and Seventh Sts., s w, two-st'y brick dwell. for J. H. De Atley; cost, $3,000; Wm. Price, builder.

Eighth St., between D and E Sts., n w, three-st'y brick store, 26' x 100', for Chas. Baum; cost, $8,000; C. A. Didden, architect; A. H. Corbett, builder.

Bids and Contracts.

BALTIMORE, MD. — The following is a synopsis of bids for labor for completing the first story of the post-office and court-house, opened September 21, 1883: —

M. A. McGowan, $13,537 (*accepted*).
W. H Johnson, $14,453.
M. Giblin, $15,000.
Rees Evans, $17,145.52.
G. O. Cooke, $17,900.
Joseph G. Loane & Co., $18,200.
Justin McCarthy, $18,982.

CHARLOTTE, MICH. — Messrs. Healy & Millet, of Chicago, have the contract for decorating the Universalist Church; cost, $600.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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NOVEMBER 3, 1883.

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A STORY is going the rounds of the newspapers to the effect that the sewage-farm which receives the drainage of the new model town of Pullman, Illinois, closed its accounts for the present year with a profit of eighty-five hundred dollars. The paragraph, as it came to us, went on to say that the area under cultivation was sixty acres, and that the cost of the sewerage works was eighty thousand dollars, so that the result showed a profit of five per cent upon the investment. We need not call attention to the fact that eighty-five hundred dollars is not five, but nearly eleven per cent on an investment of eighty thousand dollars, and that, moreover, a net profit of eighty-five hundred dollars in a single year from the cultivation of a tract of sixty acres, sewage or no sewage, would imply extraordinary farming, quite independent of any engineering, so that there is apparently a mistake somewhere; but with all allowance for exaggeration or error, the statement, if it is not a pure fabrication, would seem to indicate that the Pullman sewage-farm has during its first year of operation proved in some degree an economic success. We will only say that this report, if it should be confirmed, would constitute the most important piece of engineering intelligence which has been published for a hundred years. If a single town of seven or eight thousand inhabitants has been able, by distributing its sewage upon land selected for that purpose in its vicinity, to gain in return a net profit large enough to pay five per cent interest upon the cost of the sewerage system and the irrigated territory, we may predict with confidence that no more pipes will ever be built for spoiling rivers and harbors with filth.

YET there is nothing inherently improbable in the Pullman rumor. The town sewage-farm, which comprises an area of fifteen hundred acres, although only a part is used for irrigation, is old and exhausted prairie land, admirably adapted for restoration, by proper manuring, to its old fertility. The two years since the drainage works were established give rather a short time for subduing the soil and bringing it back to something like normal productiveness, but the fertilizing effect of frequently repeated applications of diluted manures is so extraordinary that almost anything might be believed of a well-managed farm, irrigated sufficiently, but not too copiously, with liquid house-wastes collected separately from storm and subsoil water. It is said that in Belgium, where cultivation is carried on with great care, the average yield of wheat to the acre, from ground which has been closely tilled for three thousand years, is about four times that obtained from the virgin soil of our own Red River region, which, although now the richest natural grain district in the world, is losing its wheat-producing quality with each successive harvest. This striking difference in productiveness between well-managed old land and the richest natural ground well illustrates the advantage to be derived from the application of cheap and easily-distributed manure to an exhausted soil, and the sight of the brambly deserts which surround most of our large cities within a radius of thirty miles from the outfall of the sewers which convey millions of tons of liquid manure annually to the sea cannot but suggest a wish that the means might be found for ameliorating the one by the judicious use of the other. It is not a little remarkable, as an instance of the great economic importance of the proper use of fertilizers, that while the pine forests of the Northwest are being laboriously cleared away and burned off to make room for grain, the fields of southern Massachusetts, which grew abundant crops of wheat not many years ago, are everywhere being sown with the seeds of pine trees; the very plant which our great-grandfathers destroyed, to make room for more valuable crops, being now the most profitable growth to be obtained from the land which has in half a dozen generations become practically sterile. It is hardly too much to say that for such districts as these sewer irrigation affords the best hope of reclamation. No farmer ten or fifteen miles from the nearest town could think of buying and transporting ordinary manure enough to restore an old pasture lot of a hundred acres to fertility. He can keep a small vegetable garden in good condition, but with the rest of his land there is nothing to do but let it grow up with timber. His neighbors are in the same condition with himself, and the district in which they live is thus left desert, with the exception of an acre here and there of ploughed land, and something more of haying ground in the alluvial valleys. The sewage of a city like Boston furnishes exactly the means for restoration of such land on a comprehensive scale. At a moderate estimate, the fertilizing value of city sewage, properly applied, is about two dollars a year for each inhabitant, and if the sewage could be brought where it is wanted, an annual tract of fifty or a hundred thousand acres might be restored to a productiveness which, with greater care in future, might be made permanent.

A VERY singular accident occurred recently at Moerlein's brewery at Cincinnati, which should convey a warning to those who may have to do with ice or cooling machines. The cellars of the brewery are cooled by ammonia-gas, which is carried through them in pipes, and is made to abstract heat from the surrounding atmosphere by alternate compression and expansion. In some way, probably by the failure of a joint, the gas in the pipes was suddenly set free just outside the cellar, under the stable where the horses belonging to the brewery were kept. The ammonia-gas, or rather, the vapor of hydrated ammonia into which it is immediately converted on diffusion into a moist atmosphere, has an intensely corrosive action upon animal tissues, and in a few seconds the air of the stable above the broken pipe had dissolved enough of it to act energetically upon the lungs and eyes of the horses tied in the stalls, disorganizing them so rapidly that before they could be removed sixty-six of them were either dead or dying. Even the horses attached to a street car which happened to be passing the building were so powerfully affected by the contaminated atmosphere that they fell to their knees, and were with difficulty roused to drag the car and its passengers out of reach of danger. Fortunately, the day was Sunday, and no human beings were within dangerous proximity of the broken pipe excepting one man, who happened to be standing on the sidewalk near the stable door, and was seen to fall suddenly by some people at a distance, who ran to him and succeeded in dragging him into a purer atmosphere.

A VERY successful experiment in the transmission of force by electricity has lately been carried out at Grenoble, in the mountainous region of southeastern France, by the distinguished electrician M. Marcel Deprez. It seems that there is, about eight miles from the city, a small water-fall, and the municipal authorities, conceiving the idea of bringing this wasted force to be utilized in the town, entrusted M. Deprez with the task, under the supervision of a commission of engineers. The necessary machinery was devised by M. Deprez, and when set in place worked admirably. A water-power of seven horses was taken from the torrent, and transmitted as an electric current to Grenoble, where sixty-two per cent of it was recovered again in the form of motive force, and utilized to drive a saw-mill, a printing-press, and several lathes, besides spending its surplus strength in forcing a jet of water into the air in the form of a fountain. The people of Grenoble, pleased at their participation in the new enterprise, interested themselves deeply in it, and on its successful conclusion made M. Deprez

the lion of the hour, illuminating their houses in his honor, and giving him a public dinner. It seems to us that it only remains for some of our own towns, situated in the neighborhood of water-falls, to invite M. Deprez to cross the Atlantic and lend them his valuable services. With such appliances as his, the longing that has so long possessed the people of Buffalo to get control of the force of Niagara might, it would seem, be in part gratified.

AMONG the papers contained in the recent issue of the *Proceedings* of the Royal Institute of British Architects one of the most interesting is that upon Domestic Buildings in Southern Sweden, by Mr. Alexander Beazeley, a civil engineer who lived for some years in that country. The primitive type of Swedish dwellings seems from Mr. Beazeley's account to be found in the "bad-stofva," or "bath-house," of which many examples remain in the remote country districts. The "bad-stofva" consists simply of a log hut, precisely similar in construction to those so common in our own country, but lower than is usual with us, and roofed, with poles instead of shingles, resting against a ridge-piece, and covered with birch bark, and this again with thatch or turf. The house is always set with one gable facing southward, and the doorway is placed here, the roof being extended to form a deep porch over it, supported by posts and an open timber gable. Inside the "bath-house" is a fireplace, consisting of a shallow pit near the middle of the earth floor, lined with stones, and furnished at one side with a slab of granite, on which is, or rather was, placed the bread intended to be baked by the heat of the fire kindled in the pit. There is no chimney in the structure, the smoke from the fire escaping through a hole made for the purpose in the top of the roof. This smoke-hole forms also the principal window, but small loopholes between the logs furnish additional light and air in various places. The stone baking-slab, in addition to its legitimate use, has from time immemorial served also as a most convenient appliance for the administration of a vapor bath, the bather having nothing more to do than to place himself comfortably upon it, and throw pailfuls of water upon the hot embers and stone linings of the fire-pit below. It is due to the refined civilization of the modern Swedes to acknowledge that the cooking and bathing are now as a rule separately accommodated, but the name of the "bad-stofva" still recalls the use to which the room was put as late as the last generation.

THE next advance in the art of domestic architecture in Sweden appears to have been the development of the "bad-stofva" into the "lag-stofva," or "low house," constructed in the same way as the earlier dwellings, but more luxuriously planned. The open porch of the primitive examples is now converted into a closed vestibule, and the room which forms the remainder of the dwelling is much more elaborately furnished than before. In particular, the ancient ash-pit, although still retained, forms now only the hearth of an enormous open stove, built of granite set in clay, and plastered outside with clay, the top forming a dome, elongated into a chimney, which projects through the hole in the roof used formerly as the smoke-vent, and is provided with a damper like those sometimes employed for steam chimneys, consisting of a cover of boards or a flat stone attached to the end of a lever, and shutting down over the top of the chimney. At one side of the fire opening is the oven, exactly resembling that used in our own grandfathers' houses, and covered with a flat top, which serves for drying corn, and formed also, in the good old days, the customary sleeping-place for the beggars who might honor the house with their company. Opposite the fireplace is the principal window, formed in the roof, like a skylight, but low down beside the eaves, and glazed, even within very recent times, with animal membranes, or with very thin slips of wood, plaited together. Under the window, and generally about this portion of the room, are benches, which in former times served as seats or tables by day, and as couches by night. The more remote end of the room anciently formed the state apartment of the mansion, and was separated from the rest by a bench set transversely. The august enclosure thus formed contained a "hög-bord" or high dining-table, which served both for banquets when distinguished company was entertained, and as a couch for the distinguished company when the festivities were over, and at one end of the high table stood the still more dignified piece of furniture known as the "hög-säte," or high seat, consisting of a bench covered with a canopy, supported on wooden posts. The "hög-säte" was reserved exclusively for the lord and lady of the mansion, who occupied it by night as well as by day.

THE "lag-stofva" is still found throughout the rural districts of Sweden, but additional apartments in accordance with modern ideas are generally attached to it. One of the earliest additions of this kind seems to have been the "loft," a two-story structure, evidently intended for defence, and consisting of a ground floor, opening only into the interior of the main house, and used as a store-room, and a projecting upper story, accessible sometimes from the inside, and sometimes only from the outside, by means of a trap door in the projecting portion, and a ladder, which could be drawn up on the approach of danger. This upper story of the loft was generally divided into two or more rooms, one of which was occupied as a bedroom by the young ladies of the household, who could not be accommodated on the dining-table or on top of the stove, while the others served sometimes for storage of valuables, and sometimes for the reception of specially welcome guests. In general, the loft was so placed as to defend, in case of need, the main doorway of the house, and a part of the projection of the upper story was utilized, as it is in the Swiss châlets to this day, as an open balcony, where the occupants could take the air without fear in case of siege. In more recent times many alterations have been made in the arrangement both of the "low house" and the loft, to fit them for modern habits of life. Windows have been added in various places, additional doors provided, and a whole group of two-story structures has in some cases taken the place of the single domestic fortification, but through all these changes the type of the long, low living-room, with the other buildings as appendages to it, rather than superior portions of the structure, has persisted with little variation.

THE editor of the *Builder* gives in a recent number a very interesting description of some personal experiences of earthquakes, in illustration of the discussion which has taken place with regard to the catastrophe at Ischia. The most important event of the kind at which the writer had assisted was that of 1858, which killed thirty thousand people in a single province of Southern Italy. Happening at the time to be in Naples, on the border of the shaken region, he observed, about nine o'clock in the evening, a sudden movement of the room in which he was seated, so violent as to swing the large chandelier, which hung from the ceiling, through an arc of more than ninety degrees. The motion continued for some minutes, the room shaking like the cabin of a ship at sea, and similar shocks followed each other at intervals through the night. The whole population of the city rushed from the houses into the street, to stay there until morning, the richer classes sleeping in their carriages, but the next day? when the earthquake was over, and the panic had abated, it was found that only one stone in the city had been shaken from its place, although the power of the subterranean convulsion had been so great as to raise permanently the whole shore of the bay, twelve miles long, about eight inches. The English architect naturally took upon himself to study the construction of buildings which could resist such shocks, and discovered that the walls of the lower story of the house in which he had himself felt them were seventeen feet thick, and that walls of less than three or four feet in thickness were quite exceptional, and if more than fifty years old were generally cracked and seamed by previous earthquakes. Another circumstance to which much of the enduring quality of the masonry seemed to be due was the excellence of the mortar, which in Naples, as generally in Southern Italy, far surpasses in tenacity that used in other countries. The method of making this superior mortar deserves to be widely known, as there is no doubt of its value. The first thought of the Neapolitan mason is to give the longest possible time for the slaking of the lime to be used in his building, and with this end, before any other work is done, a pit is dug close by the proposed structure, into which lime enough for the whole building is thrown, and covered with water. The lime slakes and swells, forming a stiff paste, the top of which is moistened occasionally, to prevent it from drying hard, and portions of the paste are dug out from time to time as wanted for mixing with the sand for mortar. In this way the slow secondary slaking of the lime, which adds so much to the smoothness and tenacity, often goes on without interruption for one or two years before it is made into mortar.

THE GABBERT SCAFFOLD AND SCOTCH CRANE.

THIS very efficient appliance is being more generally used in the large cities of England, and in the north of Ireland as well as in Scotland, and, as a correspondent in Washington has asked for an "explanation" of this combination, and a "drawing showing the construction of the Gabbert scaffold described under the head of 'Builders' Scaffolding,' V," we have pleasure in supplying the following additional particulars which we think will satisfy his requirements. We therefore refer the reader to page 171, No. 354, (October 7, 1882,) for the general description of the Gabbert scaffold, which we may here briefly say consists essentially of a triangular arrangement of three groups of braced piers, each of four upright posts braced together lattice-wise in successive stages. (See Fig. 1.) It will be observed that Figure 1 tallies very nearly with the description there given beginning with line 17, and on to the end of the fifth paper. The latter portion of it, however, describes a simpler form, represented in Figure 2, which is adapted for less heights of staging and compass of derrick. When the staging is high, horizontal rails, at about one-third or one-fourth of its height, measured downward from the top, are bolted to the outside standards of the three pier-like structures called standards, and sometimes "cages," — binding them all together, each to the other, all around the combination, as shown in Figure 1. The heavy timbers, usually 10, 12, or 14 inches square in section, which connect the three braced piers together at top also support the gangways, or, as is frequently the case, a triangular platform, which is shown in Figure 2, and also in Figure 3. To prevent these timbers from sagging they are supported in the middle by posts or diagonal braces carried up from the above-mentioned rail. (See Fig. 1.) The cross-diagonal or lattice-bracing described in the fifth paper is there shown to occupy the space or, as it were, panel, thus formed, on each vertical side of the semi-cube-shaped combination, triangular on plan, which the three piers or cages assume. The plan of the arrangement of the cages is shown in Figure 3, but A B are to be regarded as in the positions indicated by dotted squares. It is to be observed that frequently the two stay-cages, *i. e.*, piers, immediately underneath the foot of the back-stays of the derrick, are only single braced, alternately in opposite directions in successive upper panels. They may be described as located at the acute-angled corners of the right-angled[1] triangular framework, the *upright* of the derrick being placed over the right or obtuse angled corner, which is in the centre of the circle described by the jib in its rotary movements, also shown in Figure 3, and which immediately supports the upright part or "stock" of the derrick and the foot of the jib. The derrick-crane is an inseparable accompaniment of the Gabbert scaffold, and both are therefore shown together in their normal connection in Figures 1 and 2. They are made for steam-power as well as hand-power and sometimes are both hand-power and steam-power. These derrick-cranes are made travelling as well as stationary — to travel with a load, like the overhead travelling crane. The manner of arranging them on the double tracks is shown in Figure 3; wheel-trucks being substituted for braced piers. They are used for facing embankments with masonry, building tidal and other wharf-works, bridge-piers, arches, etc. They are also adapted and used for pile-driving, excavating for cylinder piers under water, etc. The capacity of a derrick-crane for safe lifting ranges from 15 cwt., (112 lbs. = 1 cwt.,) up to 30 tons, (of 2,240 lbs. each,) dead weight, estimated to produce a strain on the derrick chain of a moving load, because of the liability to jerking through the slipping of the chain in coiling and uncoiling round the barrel. The horizontal range of the derrick, when stationary, for carrying and distributing materials is equal to a radius of three-fourths of the length of the jib, and that of the travelling-derrick is limited only by its travelling facilities combined with the radius commanded by the length of its jib. The vertical range of jib may be taken at three-fourths to four-fifths of its length above the staging, — a steam derrick-crane with a radial capacity of 10 feet to 60 feet, double slewing gears, if they are multiplied and conveniently disposed over the area covered by the building, affords facilities for rapid building which our contractors as well as architects would do well to consider. The framework which is laid on top of the cages, instead of carrying mere gangways between the cages, is sometimes planked over to form a large triangular platform, on which tools, tool-houses, tackle, etc., are deposited. (See Fig. 2.) The cages must all rest on heavy timbers bedded firmly on the ground to prevent disturbance. The anchoring is attached to these heavy timbers, which are covered over with heavy planking to receive the building material.

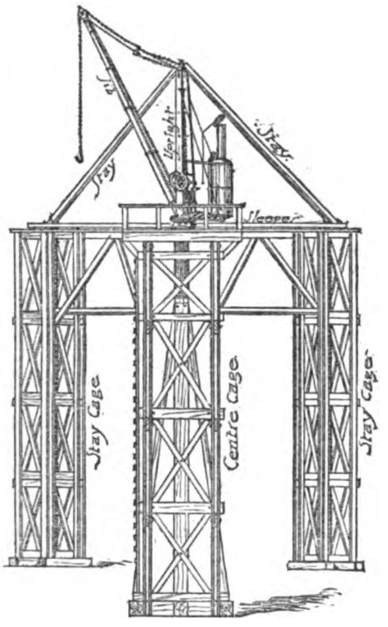

Fig. 1.

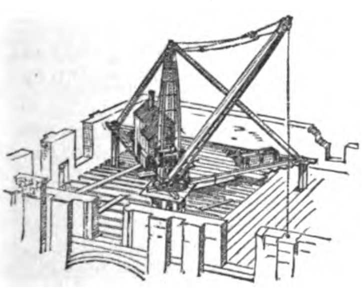

Fig. 2.

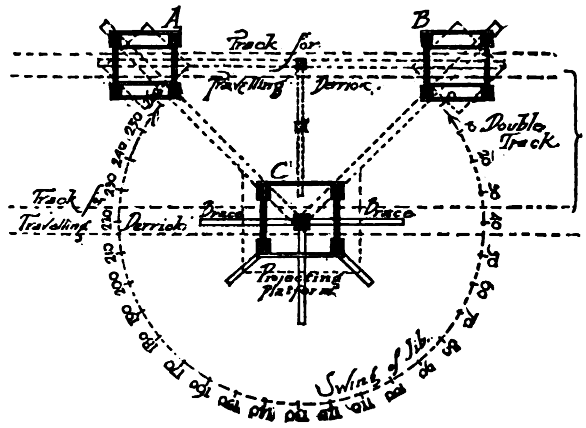

Fig. 3.

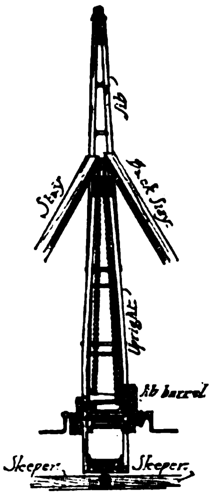

Fig. 4.

The upright is about half the length of the jib, frequently varying to only three-sevenths; the sleepers are each about the same length as the upright. The jib is a simple spar or (square) timber up to fifty or sixty feet long, greater lengths are usually of a pair of timbers bolted and bound together at a gradually increasing distance apart; at the foot it is the same width as the upright, and braced and stayed (see Fig. 2); it is also dotted in Figure 4. The hoisting tackle has single or double purchases. The upright is composed of two timbers (see Fig. 4), say, two to three feet apart, according to capacity, at foot and at the same distance apart for the lower one-third of its length; the upper two-thirds being gradually curved together towards the top, where they are bound together by a square iron head bolted thereto, which carries two pulley sheaves for the jib and hoisting chains and a heavy iron spindle or pivot which is clasped by the eye-irons bolted to the upper ends of both stays; the upright pieces are held rigidly together by a system of shoulder bolts; the foot of the upright is carried by a strong flanged iron plate firmly bolted thereto, and carrying on one side a heavy compass-hinge joint, a socket being formed in the single part of the joint to foot the jib into. This plate also carries a spindle or pivot underneath, which works in a sole-plate to which the converging ends of the sleepers are bolted; the foot of the stays are bolted to the sleepers by means of strong iron connections of various patterns. The anchor-bolts run through the sleeper and stay where they join, the head resting on large washers; a chain or rod is connected by an eye, and carried down to the weighted plank-frame on the ground. The upright carries at back a conical barrel (see Fig 4), on which is coiled a chain passing over a pulley at the top of the upright to raise or lower the jib by either single or double purchase (single for hand-power, and double purchase for steam-power). The jib gear is so arranged with self-acting pawl and ratchet that it cannot run down accidentally. It also carries at front a cylinder barrel for the hoisting chain (see Fig. 4),

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[1] The obtuse angle of the triangular frame usually ranges between one-fourth and one-third of a circle, *i.e.*, between 90 degrees and 120 degrees.

which passes over the second pulley at the top of the upright, and thence over a pulley at upper end of jib, and usually runs through a guard fixed to the jib-stay to prevent inconvenient sagging of the chain when unloaded. Spur gearing, in which pinions work, single or double purchase, is fixed to these barrels; winch-handles work the pinions with in-and-out gearing to both barrels (see Fig. 4). This is the arrangement for hand-power derricks. For steam-power the upright is bolted to a large flanged foot-plate which carries the steam cylinders, with their pistons, valve, feed-pump, and crank connections and attachments. An extension of the foot-plate forms a platform for operating, and also carries the boiler (see Fig. 1). The outer end of the platform is braced to the head of the upright so that the weight of the boiler acts as a counterpoise to the loaded jib. A large stiffened sole-plate in which works the foot spindle of the upright is bolted to the frame beams of the staging. On top of the sole-plate a large spur-wheel is bolted, into the teeth of which a pinion, worked by the engine, is geared, which rotates the upright, with jib, load, etc., and is called the slewing gear. In modern derricks the slewing gear is made double action by means of double friction-cones, which revolve and raise or lower the jib whilst the load is suspended without stopping or reversing the engine. The engine is usually double cylinder. A friction-brake controls the lowering of the load.

For the large steam-power derricks, *i. e.*, above the five-ton size, it is not generally recommended or advisable to mount the boiler on the derrick, because of the inconvenience of raising it to the top of a high staging, and as feed-water, fuel, etc., must also be supplied up there, and the stage work must be of correspondingly extra strength, it becomes a question to be decided by local circumstances whether steam cannot be more economically and conveniently supplied from a stationary boiler on the ground, especially if there is one already in use for other purposes. In England mortar-mills, stone saw-mills, rubbing-beds, etc., form part of a contractor's plant, and are often worked on the premises by steam-power supplied from a stationary or semi-portable boiler; in such cases the derrick is often supplied from the same source.

As in every other mechanical appliance skill and care are requisite in its manufacture, erection and working to prevent accidents, but the crane derrick mounted on the Gabbert scaffold is not more fruitful of accidents than the usual appliances employed by our own contractors. In point of economy of time and money I think it will compare favorably in large jobs. The operator of a large steam-derrick crane requires to be a skilled, cool-headed, quick and steady man; none other ought to be allowed to have charge of one. In large works a small boy is kept to call out directions to the operator as to lifting and depositing materials when his own view is obstructed by advancing walls, etc.

The following are usual sizes, and their approximate weights for hand and steam power, respectively, in tons of 2,240 pounds, lifting power: —

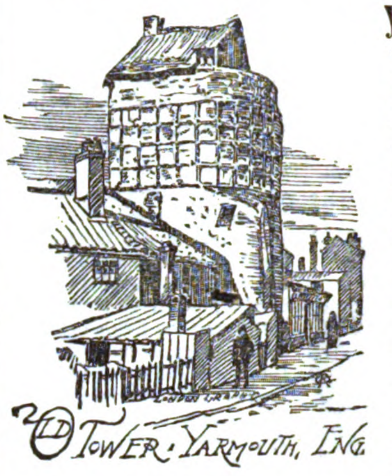
Lifts,	1 ton (size),	2 tons,	3 tons,	5 tons,	10 tons	(size-power).
Hand-power,	1½ ton weight,	2½ "	3¼ "	5 "	9 "	weight.
Steam-power,	4 tons weight,	5 "	6½ "	10 "	16 "	weight.

The makers of derrick-cranes have nothing to do with the design or construction of Gabbert scaffold; each building contractor has his own ideas and system of arranging the proportions of breadth to height of composite standards, etc., and which seem to depend very much upon the magnitude or class of jobs which each usually undertakes, as there would naturally be a disposition to avoid building fresh Gabberts specially adapted for each job, but rather to adapt the same standards, etc., for high buildings that had been previously adapted and used for lower buildings by merely adding one or more panels to the height of the old composite standard.

A common width of base is six feet square for the back-stay standards for nearly all classes of jobs, except public buildings, etc., while for smaller buildings the centre standard *C* is six to eight feet square, and for large jobs it is ten, twelve feet or more square. The cages are divided into panels vertically, in such proportion to its breadth that the angle which the diagonal makes with the vertical shall be 30°, whereby the height of panel is twice its width.

THE BORDER LAND OF ANTIQUITY. — A Yankee visitor to England had, on the outer passage, played poker till, on arriving in the Mersey, he found himself, after many vicissitudes, the winner of eight pounds. After the manner in which equally pious men of old used to build a church or endow a shrine after a prolonged bout of wickedness, our young friend, finding in an old furniture shop in Durham a piece of carved wood certified by the second-hand furniture man to have formerly been a part of the altar of the cathedral, bought it with the intent to present to his parish church. When others ruefully counted up the cost of facing the Customs officials with their importations the reformed poker player complacently eyed the case containing his altar-piece. "That's real sixteenth-century work," he said. "It goes through as an antiquity, duty free." I met him in the Customs shed two hours later. "What's the matter?" I asked, noticing his flushed face and angry mien; "has the antiquity come out broken?" "Antiquity be darned," he answered, with a painful profanity. "'Twenty dollars duty,' says the fellow to me when I showed him the invoice. 'Sixteenth-century work,' says I, 'goes through as an antiquity.' 'You bet it don't,' says he. 'Antiquities don't begin till fourteenth century. Twenty dollars duty, but you can pay under protest.' So I had to pay for a mean matter of two centuries. If I'd only known the regulation I guess that altar would have been made two centuries earlier." — *The British Architect.*

THE FIRE RISKS OF ELECTRIC LIGHTING.[1]



THERE is a great difference between the electric currents which have been in constant use for telegraphic purposes, and those which are to be supplied by the undertakers under the Electric Lighting Act. The latter can only be said to be free from danger when the heat generated by the current is utilized in its right place, and not developed in the conductors or wires which lead the electricity to the incandescent lamps.

The Fire Risk Committee have already issued rules for the guidance of users of electric light; these can hardly be said to embrace all the salient points of the new subject, which can only be arrived at after years of practical work. The necessity of proper regulations has already been recognized by the insurance offices, both in the United States and Germany, and some of their special rules are given in this paper.

The conductors must be properly proportioned for the current they have to carry; whatever resistance there is in the conductor will cause a corresponding development of heat, which will vary with the amount of electricity passing, and inversely as the sectional area.

The material must be free from impurity, otherwise an impure section will increase the resistance. The extraordinary difference in the conducting power of a sample of "commercial" Rio Tinto copper-wire, as compared with the pure metal, was shown in an experiment by Dr. Matthiessen — the conducting power being only 13.6 as against 99.95 for pure copper.

The continued heating of an impure metallic conductor has a certain effect on its electrical resistance. With the sample just mentioned, the conducting power at 100° C., decreased from 13.58 to 13.558 after the wire had been heated for three days. It does not always follow that there will be a decrease in the conducting power, as, with alloys, the opposite effect is produced. A copper-silver alloy showed an increase of .264, after having been heated to 100° C. for three days, and a tin-copper alloy an increase of .13.

As the temperature in Dr. Matthiessen's experiments was not increased over 100° C, the author has made some further experiments — heating the wires by the electric current from a secondary battery, to within a few degrees of their melting point.

The following materials were tried — the wires and foils having such sectional area, and so arranged that, on the current being increased by twenty per cent, they were immediately fused.

The total length of each experiment was twenty-four hours, during which time the current passing through varied slightly, and the following is a mean of the results: —

Material.	Resistance before heating.	Resistance of leads.	Difference after 24 hours.
	Ohms.	Ohms.	
No. 1. Commercial tin wire	.815	.8	— .003
" 2. Lead, soft	.835	.8	— .005
" 3. Copper, soft	.81	.8	No change
" 4. Pure tinfoil	.86	.8	No change
" 5. Tin and lead alloy	.87	.8	— .160
" 6. Albo alloy in foil	.835	.8	No change
" 7. Aluminium and tin alloy	.82	.8	+ .0008

The resistances were in all cases taken at the temperature of the air, which averaged 69°.

The sign — shows that the metal decreased in resistance, and + that it increased after continued heating. Nos. 1 and 3, tin and copper, were found to scale when heated.

A change has been noticed where high-tension currents have been sent through a pure copper wire for some time—the wire in the armature of a Siemens machine, which came under the notice of the author, appeared to be brittle, and gave a fracture unlike pure copper.

The necessity of good electrical connections is very great; also special arrangements of switches and contact-breakers which, when left in unskilled hands, are liable to cause dangerous heating of an arc.

Short circuit is the danger which may be caused by badly arranged wires; most likely a conflagration will ensue unless the remedy suggested by the Fire Risk Committee and the Board of Trade is adopted — of having a cut-out or fusible plug in the circuit, which gives way when the current is in excess. These should be arranged to melt if the current is more than ten or fifteen per cent of the working strength, otherwise absolute safety is not arrived at. Ordinary

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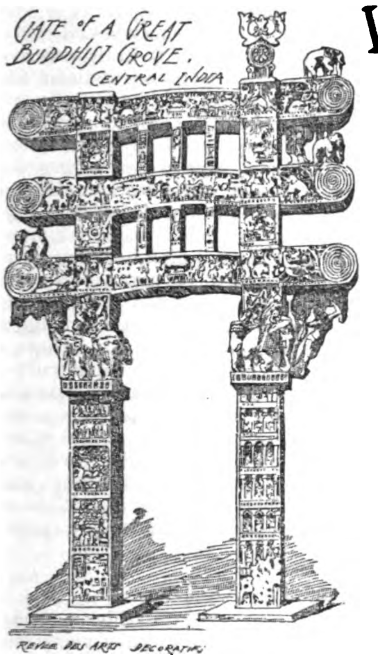
[1] Abstract of a paper by Killingworth Hedges, read before Section G of the British Association, at Southport, and published in the *Journal of the Society of Arts.*

lead or tin wire cannot be used except for very small currents, as, on fusing, the metal is scattered in a globular form, when it is liable to cause fire. The plan adopted by the author is to take pieces of foil arranged like the leaves of a book; the thinness of the foil causes it to be almost volatilized when melted. The material found to be the most reliable is a special alloy of aluminium, termed Albo metal, which is extremely tough, and can be worked much nearer to its fusing point than tin or lead.

The safety of an electric light installation is only insured by testing, which should be done by a current of higher electro-motive force than it is intended to use.

When the work has been properly supervised no trouble should be experienced, and the electric light may be said to be much safer than gas, as it is free from those accidents which are due to a servant's carelessness, or to leakage of the pipes. Whatever danger there is with electric lighting is entirely localized to the generating station, where the dynamos and engines would be under constant supervision.

LECTURES ON ARCHITECTURE.[1] — V.



WE have seen that from the earliest Egyptian architecture down to the Gothic, a chain of successive transitions may easily be defined. Each style was a modification of the one which preceded it, and not a new and foreign importation from a totally different soil. The altar stones of the Druids, and the caves of the early priests passed into the sombre temples of Egypt; the Egyptian style passed into the Grecian, the Grecian into the Roman, the Roman into the Romanesque and Lombardic, and these again, with the Saxon and Norman, passed into the forms upon which arose the idea of the pointed arch. From this practical study of facts we are soon led to the principles which they contain.

As the horizontal line is the characteristic germ of the fundamental principle of the Grecian style of architecture, so is the vertical line of the Gothic or pointed style. The full application of these two principles has been satisfactorily traced out by learned writers. As figure or form is the principal business of architecture, and as figures themselves, however various, must be resolvable into lines, it will be found that an analysis of these elementary lines will supply us with a key to the leading ideas in the origin of the differences in all the various styles. They may, then, be reduced into five: two curves, one of them convex, and the other concave; and three straight lines, one of them horizontal, the other perpendicular, and the third oblique. No other simple elementary line can be found beyond these, and it can be shown that in each of these is contained the leading principle of a peculiar style of architecture. Five styles may be enumerated as remarkably distinguished from each other in their characteristic forms; the Saracenic, the Chinese, the Egyptian, the Greek, and the Gothic. There is none, perhaps, that is not a corruption or combination of some one or more of these lines; and if it could be shown that peculiar circumstances in the history and association of each people and period in which these styles were introduced, had directed their attention to particular lines as symbolical of particular ideas, or as the natural expression of certain feelings; if it could be shown that other circumstances had led to the connection of them with certain figures, so that it should be natural for them to develop themselves in certain forms rather than others, we have then gained some steps toward the formation of a true philosophical theory in the science and the taste of architecture.

It will be necessary to enter somewhat into this field of inquiry at this stage of our progress, in order to explain with clearness the predominating principle of the Gothic style.

The abstruseness and nicety of the question might at first sight be thought a sufficient reason for declining to go into it very deeply; but as any extended consideration of the art would be incomplete without it, I am compelled to ask your close attention to the development and application of this great elementary idea. I have only adverted to it incidentally in the previous lectures, because the present seemed to be the most suitable place to bring it forward; but you will readily perceive that I have still kept it constantly in view, so far as it was possible to adhere to it, without a distinct statement of it in an explicit and detailed form.

In the drawings of Chinese buildings, and those of other nations of eastern Asia, it is easy to recognize the constant recurrence of one of these lines, the *concave*, which is rarely, if at all, to be found in any other style. In the roofs of these buildings, which, as involving the principal utility of them, are the most prominent and important part, and therefore give the leading character to the rest of the slight structure, this line in its double form ⌃ is of constant and almost universal use. Every one will recollect that its figure is invariably introduced in the strange and uncouth representations of Chinese buildings upon the earthern wares with which we are familiarized from childhood. In this first instance, indeed, it is to be feared that the slightness of our acquaintance with Chinese habits of thought and history, and still more, our ignorance of those secret and mysterious analogies which make lines, and figures, and color, and in fact, material objects generally, real and designed representatives of moral and intellectual impressions, would render it difficult to account with certainty for their adoption of this elementary line; but the fact of its universal prevalence is, at least, unquestionable. Mr. Hope, one of the most learned and ingenious writers on architecture that the world has ever produced, traces its adoption with much probability to a rigid imitation of the form of a tent. From the universal propensity of all nations to retrace in their later method of construction the forms of the earlier materials in use among them, "we shall see," says he, "that the structures of the Chinese still resemble in all their parts those of the tent, their original type. In the wooden pillars, destitute of bases and capitals, which support the ceiling in such numbers, we see the poles; in the concave roofs which project from these pillars with their ribs and divisions, we see the awning of hides or pliant stuffs spread over ropes and bamboos; the curling spikes that fringe their eaves represent the hooks and fastenings; and in the lowness and spreading arrangement of the different parts we have the whole form and appearance and character belonging to the residences of the herdsmen who were the ancestors of their builders. The Chinese houses seem to cling to posts, which, when planted in the ground have struck out and become fixed there. The palaces themselves look only like a number of collected awnings; and the very pagodas or towers in their loftiness are nothing more than a number of tents piled on top, instead of standing by the side of, one another. The aggregate dwellings from the smallest village to imperial Pekin itself, in their distribution resemble nothing but a camp, and when the English ambassador, Lord McCartney, after crossing the whole of the Chinese empire from south to north, from Canton to the Great Wall, in its farthest length, was received at last on the borders of Tartary by the emperor in a *real* tent, he scarcely perceived any difference to exist between it and the millions of permanent buildings he had viewed in the course of his journey." The same idea predominates throughout the whole, and there seems indeed to be no little interest in the theory which would thus trace in Chinese architecture the intelligible meaning which ought of right to belong to so peculiar a style. We may confidently suppose it to be a part of that rigid and undeviating adherence to ancient notions on which the stability of their empire is evidently made to rest. In this way Chinese architecture becomes the expression of the leading sentiment in the character of the people among whom it came into birth.

If we next turn to the Saracenic or Moorish style, we find (and for the same reason, in the same part of the building) that the *convex* line is here equally predominant. A Turkish mosque is a little forest of domes; the slender minarets swell out into bulbs; the arches bend into the form of the horse-shoe, and though among the Arabs as well as among the Christians, the introduction of the angle into the curve of the arch was suggested and almost forced upon them, it never seems to have taken root, as it were, or to have developed itself in those remarkable results which ended in the production of a pure Gothic architecture. Something was wanting in the habits of thought and feeling among those Eastern nations to render it equally indigenous, and equally productive of a national style. Whether the taste for the concave line among the Saracens, however, flowed from a barbarous imitation of a corrupted Romanesque; from a fondness for the repetition of the crescent, or from association with any astronomical notions, — which is thought to be not improbable, — it is now scarcely worth while to inquire. Moorish architecture, like the Chinese, though in itself sufficiently characteristic has never become systematized, or settled into any distinct and regular theory of style. Its primary line which we have noticed, is one which is evidently incapable of producing variety, or of throwing itself out into general combinations; and we may proceed, therefore, to the three other styles in which the theory here suggested is still more strikingly illustrated.

Of the three straight lines, the horizontal, the perpendicular, and the oblique, the last is the one which was evidently the germ of the Egyptian style, and we now know enough of their institutions, and of the associations to which they gave rise, to account not only for their selection of it, but for its running out so universally into the peculiar figure of Egyptian architecture. This figure, it will be recollected, is that of a truncated cone or triangle; it is distinctly exhibited in the shape of the elevations of their temples, in the form of the doorways, of the columns, and of course of the intercolumns (or spaces between them), in the pyramids, the obelisks, the sphinxes, in everything, in fact, which is peculiarly of Egyptian origin; it shows itself in every outline, and meets us at every turn. The fact of its prevalence, therefore, will not be disputed, however we may differ as to its explanation; and the question before us is to decide what is the connection between this confessedly Egyptian figure and the oblique line which is assumed to be the primary element of all Egyptian architecture.

To prove this connection, then, it must be shown that there was something in the predominant circumstances of Egyptian art, employed as it chiefly was upon religious buildings, which first led to

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[1] Extracts from a lecture by the late Mr. Arthur Gilman, delivered before the Lowell Institute, Boston, in the winter of 1844-45. Continued from page 189, No. 408.

the employment of the oblique line as the expression of that something in a visible form. From the use of such a line, the figure of a truncated cone is a natural and obvious suggestion; and it is not difficult to account in the most satisfactory manner for its constant introduction. The whole history of Egypt in its arts, as well as in its politics and religion, exhibits one leading idea impressed on every part, — the idea of unlimited but unvarying progression. It exhibits their society under the pressure of an enormous power of the priesthood, which was not, however, allowed to run into abuse, and to destroy itself by its own excesses; but maintained a firm mastery and direction over the minds of the whole people; knowing no other object of ambition than to preserve its power unincreased or undiminished; content to hand down its stock of hereditary knowledge without thinking of any additions to it, leading on generation after generation in a monotonous undeviating procession of castes and families, guarding them on every side by gigantic social institutions, which were consolidated by time as well as by the sanctions of religion, and bringing up the nation with a steady vigilance over thought, word, and action, in a slow approach to the awful portals of a mysterious eternity, beyond which little was unveiled except to the priesthood themselves; even the arts — sculpture, painting, music — were not exempt from a rigid superintendence, which prohibited all license or variation. And this peculiar cast of thought, derived as it was from their political and religious system and emblematical of its origin, exhibited itself in their religious worship — as we know to be the fact — chiefly in the form of imposing processions. Processions, it has been observed, are the natural expression of a dominant power; and as they move on in a continuous line, the line constantly presented to the eye of Egyptian art, when employed in architecture, was the *oblique* or foreshortened and projected line such as is presented to every one who is advancing from one point to another straight before him. It is natural that this line should suggest an *avenue*, and accordingly the approach to Egyptian temples was made through avenues of obelisks and sphinxes, forming in fact the real temple for the people, as the mysterious halls within the portals of the building to which they led were reserved for the priests and the initiated alone. The perspective of this avenue, it will be perceived, gives us immediately the figure in question. As the oblique is clearly the Egyptian line, what, then, would be the figure suggested by it, but the truncated triangle formed according to the laws of perspective by the two lateral lines of an avenue? converging not to a point, but to the front of a portico at the end of the vista, and harmonizing in every particular with our innate ideas of grandeur, solidity, and immutability. And such being the primary figure, it was repeated on every part in order to preserve this solemn unity and harmony, which it will be admitted, can be rendered perfectly compatible with variety and multiplicity of detail, provided each variation be only a repetition, however modified, of the one original type or figure.

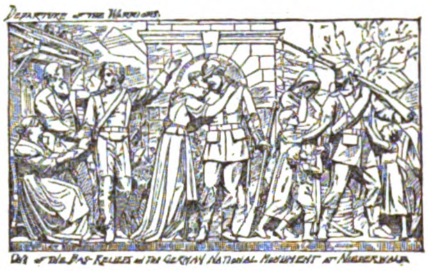
It might, perhaps, be interesting to dwell longer on this mark of the Egyptian style, were it now the principal object of remark; but enough has probably been advanced to give a general illustration of the hypothesis that in this, as in every other consistent style of national architecture, its great peculiarities depend on the adoption of some peculiar figure, on which it works as a base; that this figure was generated or suggested by some peculiar elementary line; and that the adoption of this line depended on peculiar circumstances and habits of thought in the age in which the style originated. This is perhaps the most comprehensive view which it is possible to take of the philosophy of architecture.

From what has been previously said of the Grecian style (which next presents itself to notice) it will be evident that its type is to be found in the *horizontal* line, and its connection must be traced in a similar way. Call to mind the representations of Grecian edifices which have been exhibited here on two former occasions, and you will recollect how vestiges of the Egyptian were still distinguishable in the shape of the Doric columns, the figure of the doorways, and even in the outline of the elevations. Whatever variations of detail might have been introduced — and they certainly were not few or unimportant — the general configurations of Grecian architecture were such as might naturally be expected among a people whose art and wisdom, and much of whose theology, was derived from the distant banks of the Nile. Even the front of the Parthenon does not present a regular parallelogram to the eye, but rather the same form of truncated triangle, though the transition from it is evidently approaching. But the Egyptian avenues were abandoned in Greece; the Athenian temples stand by themselves, not as terminations for lengthened processions, but as insulated objects for the eye of the spectator. Under their more popular form of religion, the people were no longer to be marshalled in solemn processions, under the guidance of an overruling and perhaps a tyrannical priesthood, but to be gathered familiarly under the porticos and colonnades of their temples; and thus, as we have already seen, these became the chief and most prominent feature of Grecian architecture. But these porticos and colonnades were designed for use — for art in those days had not, as in our own, become so meretricious and unmeaning as to calculate for any primary purpose but use — and this use was shelter, and the shelter was provided by the roof which these columns sustained. In the roof, therefore, and in the entablatures on which it rests, were to be found the characteristic features of the new style, just as the line of the Egyptian was found in its most important part, the avenue. This feature was the horizontal line, and, although an eye accustomed, by the peculiarities of Gothic architecture, to search for the picturesque instead of the simply beautiful, would prefer to fix itself at the angle of the Grecian colonnade, and so throw the building into more of the Egyptian form — pillar dwindling behind pillar, and the lines of the base and cornice converging into the truncated cone — such was not the true temple of the original Grecian taste. You will recollect that that style was shown to delight in symmetry, and proportion, and regularity, in measuring relations, in adjusting parts from a common central point, in forming systems over which it placed itself as a critic and spectator, judging everything by the same rule, and referring every object to its own eye. And how clear is it that in all this we may trace the altered form and character of the human mind, after its transition from the oppressive, monotonous region of Egypt to the stimulating atmosphere, the free soil, and the unfettered habits of thought in the Grecian colonies. Their religious worship was turned into a luxury of the imagination and the senses, their traditionary philosophy into schools and sects of scepticism, their government into a conceited democracy, and their morals into licentiousness and self-indulgence and self-will. Thus what may be termed the rationalistic power of the Grecian intellect, stimulated by its conceit, acted on every subject which was brought within the range of the Grecian mind, and its effect upon architecture was to produce a system whose beauties are based upon theorems of geometry, and calculated by the fractional divisions of arithmetic. All its figures are produced by one and the same kind of mental operation, and coincide throughout with the natural tendency of Grecian fancy and feeling.

But when the arch was introduced by the Romans and engrafted upon the Grecian column, the seeds of decay were fairly sown in the system of classical architecture. If Rome, says a late writer by whom this theory is admirably supported — if Rome suffered herself to be led captive by Grecian art, she still retained much of her original wildness and uncouthness; she never possessed that quick intuition and that instinctive sensibility to harmony which had characterized the Greeks. She was not only incapable of appreciating the delicacy which shaped the minutest details of Grecian architecture, but in her attempts to grasp the grand and gigantic, she was obliged to combine a number of parts without being able to form them into a perfect unity. A scene of confusion was generated by the intrusion of the arch; this is an inimical feature in the system of horizontal lines. Every fresh curve or circle of which the arch consists requires a new centre to be taken by the eye, and every fresh point thus taken introduces a new movement, and disturbs the leading principle of the classical style. Thus the eye was carried in contrary directions, and a variety of figures were introduced, which were not repetitions or modifications of one primary type, but each of them wholly unconnected with the other.

WHAT THE ARTS COST.

Departure of the Warriors.



One of the Bas-Reliefs on the German National Monument at Niederwald.

AT this moment, when every one gossips about painting, engraving and sculpture, it may be of interest to inquire into the expenses which an artist is actually compelled to incur in the execution of a picture, a statue or an engraving. Let us begin with the painter as he leaves the Ecole des Beaux-Arts. It is self-evident that he needs a studio. You know that it would be difficult to-day to find one that costs less than six hundred francs yearly. The expenses for furniture, fixtures, etc., need not be high. At a pinch a stand for models at twenty francs, an easel at fourteen francs, a box of colors at fifty francs, brushes to the value of five francs, and a stool for three francs will be sufficient. To these we must add the price of canvases, which, as a matter of course, varies according to size. All this can be managed quite nicely with one hundred and fifty francs.

But from the day the first stroke of the brush is laid the expenses keep on rising, rising. It is a veritable flood-tide. Are you a lunatic, such as Manet was? Then, instead of brushes costing thirty centimes apiece, you will have to use martens at eight francs. To Naples yellow, worth seven sous, you will prefer cadmium at 2.50 francs. Do you like genuine ultramarine? You cannot get it for less than twenty-five francs. Do you paint costumes? Go and buy stuffs! And what are these expenses compared to those caused by the models. An ordinary model asks five francs each sitting. Choice models cost ten and fifteen francs. A well-studied picture usually requires something like sixty sittings. Count it up. If you admit that a painter has a right to eat and be clothed, you will admit that, if he does not paint more than one picture per year, he must sell it for at least 12,000 francs to keep him from starving.

Now as to sculpture. Unfortunate kneaders of mud! For them the expenses of studio, models and costumes are the same as for the painters. Brushes and colors are replaced by a few instruments which cost fifty francs altogether. The modelling stand costs 400 to 500 francs, and as a rule three of them are needed. Clay is sold for fourteen sous the lump; twenty-five lumps will do for an ordinary statue. The work done, the moulder is called in, who begins by

asking one hundred and fifty francs. Is it worth the trouble to try to make marble pay? For a statue of a metre forty it will take a block worth 1,200 francs. And so much the worse for the artist if the block develops flaws, and has to be replaced. In that case he will be compelled to pay the expenses occasioned by the improvidence of nature. Then there is the pointer who blocks out the marble in the rough, and the skilled stone-cutter who turns over the statue to the artist all made, with the exception of the beauty of expression. Pointer and skilled workman demand a formidable sum, 2,400 francs. In short, a marble statue of ordinary size costs its author at least 6,000 francs, without his having eaten a morsel! It will be seen that sculpture is a craft for the rich, and the majority of sculptors begin life in poverty. Judge of their struggles, their battles, and—never pay less than 20,000 francs for a statue.

Of all the arts of design, engraving from the point of view in question, is the least onerous. An engraver, if need be, can get along without a studio. You can work admirably at a little table placed before the best window in the room. The tools are relatively cheap. Says Charles Jacque: "Rembrandt would have produced a *chef d'œuvre* with a bit of zinc, and a nail picked up in the street." To-day, for 200 francs, you can find at Lamour's all your heart may desire. Of course, the original engravers need models, but the reproducers can get along with a photograph. How is it, then, that some of the latter, more especially the burinists, are actually forced to ask such high prices for their plates? It is because, beside the talent, time must also be paid for. Bracquemond put more than a year into the engraving of "Labor." Champollion asked two years for the execution of "The Chase of St. Hubert" after Baudry. Robert sank five years in the engraving of the new bank note.—*L'Estampe.*

THE ILLUSTRATIONS.

A COLLECTION OF CAPITALS, MAINLY BYZANTINE.

INTERIOR OF ST. PETER'S CHURCH, ALBANY, N. Y. MR. R. M. UPJOHN, ARCHITECT, NEW YORK, N. Y.

COMPETITIVE DESIGNS FOR A MECHANIC'S $1,500 COTTAGE SUBMITTED BY "*Engineer*" AND "*Thumb-Tack.*"

FOR a description of these cottages see the following article.

"'*ENGINEER.*' Plan too small. Although it may suit the sum to be expended, a family would be very uncomfortable in such small rooms. The outside too complicated. Drawings carefully made, but lacking in artistic touch or feeling."—*Extract from Jury's Report.*

The design submitted by "*Thumb-Tack*" was received so late that the jury had already made their award, and therefore this design was not submitted to their consideration.

HOUSE FOR TRUMAN B. HANDY, ESQ., CLIFTON, O. MR. J. W. M^{C}. LAUGHLIN, ARCHITECT, CINCINNATI, O.

THE COMPETITION FOR A MECHANIC'S HOUSE.—VI.

DESIGN SUBMITTED BY "*Thumb-Tack.*"

EXCAVATION:—Excavate for cellar 7' in the clear. The portion of plan marked "foundation" to be excavated only 4' for foundation walls. Excavate also for cistern of fifty-barrel capacity.

Foundations:—Build all stone-work of native sandstone, quarry-faced, laid in good lime-mortar. All walls shall be 18" thick, neatly pointed above grade with cement-mortar. All jambs neatly tool-dressed.

Brickwork:—Build chimneys of good sound brick with 8" x 8" flues and neatly pargeted; flues shall have a soot-pocket, 18" deep, and holes fitted with No. 7 crockery collar. All exterior work in chimneys to be laid of sound face-brick with neatly pointed joints. All fire-places shall have trimmer-arches and be furnished with hearth of freestone.

Carpenter Work:—Studs, rafters and joist to be hemlock. All finish to be white-pine, second common. All flooring to be white-pine.

Joists:—All floor joist shall be 2" x 10," 16 "on centres, cross-bridged every 7'.

Studs:—All studding to be 2" x 4," 16" on centres, to rest on a plate in all cases and be well stiffened with cross-blocking. Plate for rafters shall be doubled 2" x 4," laid with broken joints and securely spiked together. Sill to be 4" x 6," laid in mortar.

Rafters:—Rafters to be 2" x 6," 16" on centres, with collar-beam 8' from floor, and all rafters to be securely nailed to both ridge-pole and plate.

Sheathing:—Roof and gable-ends to be sheathed with hemlock, second common, boarding.

Flooring:—All flooring to be second common white-pine. Floors in cellar to be 4" concrete, laid on a bed of cracked stone, drained by 4" pipe. Porch floor to be laid with white lead joints.

Shingles:—All shingles shall be 16" cypress, well nailed and laid with 4½" to the weather. All exposed joints to be flashed with tin, painted on the under side.

Weather-Boarding:—Sides of house to be covered with clear second common weather-boarding of 6" widths, laid with a lap of 2".

Outside Casing:—All window casings and corner boards to be 2" x 4" white-pine, clear of knots, etc.

Window-frames:—To be box window-frames on first floor; all others to be common frames. Dormer windows to be hinged at top and furnished with all suitable furniture. Box-windows to have cast-iron axle-pulleys and linen sash-cord, with iron weights, plain black cast-iron sash-locks and lifts. All sash to be 1⅜" thick.

Doors:—Doors to be 1⅜" thick, hung on plain pin butt-hinges and have two-tumbler-locks and keys. Front door to have three-tumbler-lock with white knobs and trimmings; all other doors to have colored mineral knobs and black trimmings.

Wainscot to be of upright tongued-and-grooved boards of 3" widths in front vestibule, with cap rail and base.

Stairs:—Stairs from first to second story to be a box-stairway, risers and treads of ⅞" white-pine; newel-post, 4" x 6," as shown, and rail with plain square balusters, three to a step. Flight from cellar to first floor to be plain mill steps with carriage of 3" x 12" hemlock, with steps gained in at the ends.

Mantels:—There will be three mantels, the cost of which shall not exceed $50.

All inside finish to be of white-pine of thoroughly dry and clear qualities; 10" base in all rooms in first story, and an 8" base in upper rooms.

Hardware:—The hardware throughout the house shall be plain black japanned. Closet doors to have spring-catches instead of locks. Windows to be furnished with suitable stays for holding open and locks for sashes. Axle pulleys, cords and weights. To be a sufficient number of cast-iron clothes-hooks in all closets in chambers.

Plastering:—All walls, ceilings and soffits of stairway in first and half story shall be plastered with good three-coat work, with hard white finish. The floors of rooms in cellar shall be of concrete 4" thick made of cement and coarse sand and gravel.

Conductors:—To be four 3" conductors with patent cut-off attached. Gutters to be of galvanized-iron as shown. Drains will connect with cistern.

Painting:—All exterior wood-work excepting shingles to have three good coats of white lead and oil. The shingle-work to have two coats of Venetian red.

Glazing:—All glass to be Pittsburgh double strength. Interior wood-work to have three good coats of paint in such tints as may be desired.

Pump:—To be one pump in kitchen connected with cistern. The sink to be lined with zinc and have a waste-pipe.

Privy:—Build a privy over a vault of 5' diameter; privy to be 6' square, with cedar sills.

Cistern:—Build a cistern of 50-barrel capacity. Bottom to be an inverted arch; bottom and sides to be a 9" wall. Inside of cistern to be cemented up to the springing line of crown arch and finished with a brush.

ESTIMATE OF QUANTITIES AND PRICES RULING AT ALLEGHENY CITY, PA.

60	cubic yards of excavation	$ 21.00
50	perch of stone	120.00
8000	brick	45.00
65	sq. yds. of concrete	16.25
50	ft. of drain	17.00
	Cistern	30.00
	Privy	10.00
1500	ft. joist lineal	90.00
4800	ft. studs, 2" x 4", lineal	96.00
3300	ft. weather-boarding, lineal	100.00
60	rafters, 2" x 6" x 20'	30.00
	Stairs	25.00
	Architraves and bases	50.00
	Mantles	50.00
14400	shingles	60.00
2320	ft. flooring	104.40
	Windows, doors and frames	95.00
	Gutters and conductors	12.00
	Hardware	15.00
	Painting and glazing	85.00
600	yards plastering	75.00
	Pump	12.00
	Sheathing	14.00
	Labor and profits 25%	293.16
	Architect's commission 6%	87.94
	Total	$1,553.75

DESIGN SUBMITTED BY "*Engineer.*"

It is intended to place this house on a narrow lot (say 50' wide), facing west. The cellar will be 6' 6" high in the clear, but the north wall will be only 4' deep (below the surface), the cellar bottom being sloped up against it in the coal-bins.

The house is to have a balloon frame, and is to be finished in pine or cypress; spruce clapboards; sawed cedar shingles, unpainted.

Interior shellacked. Parlor, hall, and dining-room, natural color of the wood; other rooms stained red.

First and second stories 8' 4" high in the clear; second-story rooms are all full height throughout; no attic.

Bath-room not fitted up at present.

Gables plastered (Portland cement) and stuck with colored glass.

Stair-rail, ash.

ESTIMATE OF QUANTITIES AND PRICES RULING NEAR BOSTON, MASS.

Excavation, 4 ft. deep	$ 20.00
25 perches dry stone wall, @ $3	75.00
Brickwork	108.00
4000 ft. framing-timber, @ $16	64.00
3500 ft. boards, @ $14	49.00
10 M. shingles, @ $4.25	42.50
800 clapboards, @ 55 c.	44.00
Outside finish, gutters, etc.	85.00
16 window-frames	24.00
Windows and blinds	35.00
Cellar windows and frames	6.00
Plastering gables	10.00
Doors and door-jambs	70.00
Stairs	45.00
Plastering	100.00
Inside finish and mantels	130.00
Concreting cellar	22.00
Plumbing (in kitchen only)	50.00

Painting, three coats (except shingles)	$10[illegible].00
Hardware and nails	57.00
Labor	350.00
Contractor's profit	150.00
Architect's commission	75.00
Total	$1,711.50

The above estimate was furnished by Kelly & McKinnon, Carpenters and Builders, 7 Western Avenue, Cambridgeport, Mass.

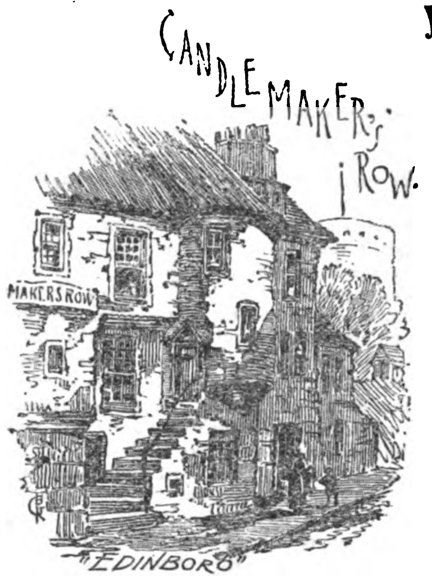
TILE-MAKING IN HOLLAND.

THE tiles manufactured in Holland are flat, hollow, S-shaped, or with a square opening in the middle to let in a pane of glass, being much used for lighting lofts and garrets all over the Low Countries. They are either red, gray or blue, or glazed on one side only. The flat paving-tiles are about eight and one-half inches square by one inch thick; they are used principally for cisterns and for bakers' ovens. The clay for tiles, it is to be noted, is in all cases more carefully prepared than that for bricks, being ground up wet in a pug-mill, or tub, with a shaft carrying half a dozen blades. By this means roots, grass, etc., are got rid of. The clay comes out of the pug-mill of the consistence of potter's clay, and is kept under a shed, where it is kneaded by women, with their hands, to the rough form of a tile, on a table dusted with sand. These pieces are carried off to the moulders, who are two in number, a rough moulder and a finisher. The tiles are then dried under sheds, and afterwards in the sun. With regard to the flat paving-tiles, they are at first rough-moulded about an inch larger than the subsequent size, and a little thicker, and then laid out to dry under a shed, until such time as the thumb can hardly make an impression on them. They are then taken to a finishing-moulder, who, on a table quite level and slightly dusted with sand, lays one of the tiles, and strikes it twice or thrice with a rammer of wood larger than the tile, so as to compress it. He then takes a mould of wood, strengthened with iron and with iron cutting edges, and puts it on the tile, which he cuts to the size. The mould is of course wetted each time it is used. The tiles are then regularly dried. In Switzerland and Alsace an iron mould is used.

The tile kiln is generally within a building, and about sixteen feet long (in ordinary dimensions), ten feet wide, and ten feet high. The walls are from four and one-half feet to five feet thick, secured outside with great beams, and so secured together as to form a square frame. Some of the largest of them are pierced with four flue-holes, as in brick kilns; but the flues are formed by a series of brick arches about two and one-half feet wide by sixteen inches high. The opening of the flue-hole is about ten inches by eight or nine inches high. On their upper surface, these series of arches form a kind of grating, on which the tiles are laid. The kiln is covered in at the top with a brick arch, pierced with holes of different sizes. The kilns are charged from an opening which is constructed in one of the side walls, which opening is, of course, during the burning, blocked up and well secured. The fuel used is turf, as in the brick kilns, and the fire is kept up for forty hours together, which is considered enough for the burning. Three days are then allowed for cooling, and they are afterward taken out of the kiln. Those tiles which are to be made of a grayish color are thus treated: it having been ascertained that the tiles are burnt enough, and while still red-hot, a quantity of small fagots of green alder with the leaves on is introduced into each flue. The flue-holes are then well secured, and the holes in the roof each stopped with a paving-tile, and the whole surface is covered with four inches or five inches of sand, on which a quantity of water is thrown, to prevent the smoke from escaping anywhere. It is this smoke which gives the gray color to the tiles, both internally and externally. The kiln is then left closed for a week, when the sand is taken off the top, the door and roof holes are opened, as also the flue-holes, and the charcoal produced by the fagots taken out. Forty-eight hours after, the kiln is cool enough to allow of the tiles being taken out and the kiln charged again. Whenever any of the tiles are to be glazed, they are varnished after they are baked; the glaze being put on, the tiles are put in a potter's oven till the composition begins to run. The glaze is generally made from what are called lead ashes, being lead melted and stirred with a ladle till it is reduced to ashes or dross, which is then sifted, and the refuse ground on a stone and resifted. This is mixed with pounded calcined flints. A glaze of manganese is also sometimes employed, which gives a smoke-brown color. Iron filings produce black; copper slag, green; smalt, blue. The tile being wetted, the composition is laid on from a sieve.

The manufacture of tiles is principally carried on near Utrecht, in the province of Holland, which, like most of the great cities of Holland, has facilities for the transportation of its produce by water communication all over the country. — *Glassware Reporter.*

A CALIFORNIA FLOUR MILL.



THE competition of India and Russia in the western European wheat markets is causing the merchants of California to use every effort to maintain their footing, and among other devices for lessening the cost of transport there is arising the practice of reducing the grain to flour before it is shipped, thereby effecting a saving of twenty per cent in freight. This carries with it the additional advantage of employing a large amount of local labor, and of turning the wheat to the best advantage, as by aid of new machinery and the best systems of milling, a far greater and better yield can be obtained than by the more antiquated methods which still to a great extent prevail here. Messrs. Starr & Co. are now building an immense flour mill and wheat elevator on the south shore of the Straits of Carquinez, about two miles below Porto Costa, and fronting the town of Crockett, to carry out this plan, the spot they have chosen being available for the largest ocean steamships, while it is sufficiently sheltered for the river barges from the interior to approach it with safety. At the site of the mill the shore curves inwards, leaving a flat rock reef mostly bare at low-water, but sloping off abruptly on the northern and western edges. Upon this reef there is being erected an eight-story mill and elevator building, about 150′ x 300′, reared upon a superstructure of artificial-stone piers and arches. The piers, of which there are 209, averaging from 5 to 8 feet square at the base, and standing 13 feet apart from centre to centre, are built upon the rock, and are connected by groined arches, standing some four feet clear above high-water level, which has an open passage under them, between the piers. The artificial-stone floor of the mill and elevator is laid over the arches, and forms a monolithic platform of nearly 50,000 square feet area. There will be 140,000 cubic feet in the piers, arches and floors, the greater part being already in position, and heavy wire cables are being laid transversely through and through the concrete above the arches to serve as earthquake ties. This portion of the work, which will cost $50,000, is being done by Mr. Ernest L. Ransome, who has long been occupied in California bringing into extensive and successful use the artificial stone invented by his father, Mr. Frederick Ransome, a number of years ago. The mill building will be 143′ x 158′, with seven stories, aggregating 100 feet in height, while the elevator, 82′ x 178′, is to be capable of storing 10,000 tons of wheat. The outside walls of the great building will be formed of heavy buttresses, rising over the artificial-stone piers, and connected with curtain walls. The floors, above the first story, will be carried by clusters of five wooden pillars, 13 feet apart. The engines and boilers are in a separate structure, the power provided for milling purposes being 2,400 horse-power, and for the elevator 300 horse-power. The ultimate capacity of the mill will be 6,000 barrels of flour per day, but it will be started with machinery for turning out 2,500 barrels per day. Agents of the company are now in Europe inspecting all the best milling machinery and processes. The docks, to be covered by two-story warehouses, are in two sections, having an open slip 104 feet in width between them. The eastern dock section will have an area of 115,000 square feet, and the western section one of 256,800 square feet, and both are to be traversed by railway lines in connection with the railroad systems of the State. From this account an idea will be gained of the extent of the enterprise which Messrs. Starr & Co. are inaugurating, and the magnitude of the trade in which they are engaged, and which they are making such great exertions to keep.— *Engineering.*

Electric Street Cars in Paris.— A trial trip was successfully accomplished lately in Paris by the French Electrical Power Company. At three o'clock, the vehicle, an ordinary three-horse tram-car, left the Place de la Nation, and after traversing the important thorough fares, reached the starting point soon after six o'clock, the distance— thirty miles—thus being made in three hours, and without the slightest accident, or frightening of horses on the route. When meeting any impediment the driver had no difficulty in bringing the car to a standstill in a second. The ease with which the car was turned off one set of lines to another, across several yards of unmetalled ground was likewise admirable. The locomotion is effected by Faure Sellon-Volckmar accumulators. The speed was nine and one-third miles an hour on level ground, and five and one-half on an ascent. This experiment, the first ever made over a long distance, proves the practicability of electric tram-cars, and it may safely be predicted that before long they will take possession of the tram routes of Paris. The estimated cost is one-half that of horse trams.— *London Standard.*

TIMBER-TESTING.

WE take the following from an English contemporary on "Testing Timber": Besides straight and close grain, freedom from sap, shakes, and loose knots, good timber, such as the best deals, should have a uniform color throughout. Appearances of timber may mislead if they are not in accordance with well-understood characteristics of soundness. In the same species of timber the strongest and most desirable specimens will be marked by narrow, regular, annual rings, indicating slow growth and close texture. The cellular tissue, as seen in medullary rays, should also be firm and compact. Uniformity of substance is one of the chief characteristics of good timber; dead knots, flaws, and shakes are, of course, prejudicial, and affect the strength. In sawn timber the architect should see that the surface is not woolly, and that it does not clog the teeth of the saw. A bright, silky lustre ought to be apparent when planed, while "a dull, chalky appearance," says one authority, "is a sign of bad timber." When the annual rings are porous, the wood is weak. Mr. Britton has remarked that good timber is sonorous when struck, while a dull, heavy sound betokens decay. "Star shakes" and "cup shakes," or splits in the direction of the rays and rings, are to be avoided, especially heart shakes, which prevent large scantlings being cut. Good deals have a uniform color, and a darkness of tone is a sign of strength and durability. In best pine timber the annual rings are hard, of a dark-red color, but these vary in tint; the rings ought not to exceed one-tenth of an inch. Oak, if of the best kind, should have "a pale brownish-yellow color, with a perceptible shade of green, a firm and glossy surface, and hard and compact medullary rays." Laslett observes: "Bright-looking timber is better in quality than dull, and that which is smooth in the working better than the rough or woolly surfaced." "The heart of trees having the most sapwood is generally stronger and better in quality than the heart of trees of the same species that have little sapwood." No doubt the microscope affords a better test of good timber than the unaided eye. The use of the microscope in testing timber was noticed in a paper read at the Franklin Institute, Philadelphia, in which the author showed that timber condemned by that instrument cannot be mistaken, and after once seeing and comparing samples of good and bad wood, it is easy to recognize the difference with a pocket magnifying glass. The micro-photographs of timber of different sorts have shown that in the strong kinds the concentric layers are close in texture and narrow in width, and the radial plates numerous, wide, long, and stout, while in poor wood the opposite characteristics prevail. With such sections of timber of known strength it would be easy to discard samples which did not exhibit the same number of rings or radial plates per inch of section. Generally, it will be found that the strongest scantlings are obtained near the sap. It is considered, as a rule, that American pine is generally less durable than that from the Baltic, though it may be clean and free from defects. The Prussian timber stands the first in the order of quality, according to Mr. Laslett, then the timber from Russia, Sweden, Finland, and Norway.

NUTS AND WASHERS.

Champaign, Ill., October 17, 1883.

To the Editors of the American Architect: —

Gentlemen, — It appears that in the article on "Rod-ends, Nuts, Washers," etc., the writer should have stated the reasons by which he was induced to recommend two different sizes of washers for rods of equal diameters and apparently resisting equal strains, according to their use in roof or bridge trusses.

The construction of roofs, excepting by a very few architects and engineers, is not at all on the same plane as that of bridges, for several reasons.

1. The loads to be supported are not so well known or so carefully estimated.
2. The strains are therefore less correctly obtained. In many cases they are not computed at all, but the truss is an imitation of one previously erected and of similar proportions. Compare the relative fulness and accuracy with which roof and bridge trusses are treated in any American work professing to consider both.
3. The materials are selected for roof-trusses with much less care, a fact easily proved by a comparison of the usual specifications for roofs and bridges. They are rarely tested, and it is therefore to be presumed that the interest of the contractor would lead him to supply materials of inferior quality, because cheaper.
4. The work is not so well done, and welds are generally permitted in wrought-iron rods, which are not allowed in good bridge-work.
5. The inspection of materials and work is much less rigid, for the clients of an architect do not so well appreciate the saving which results from the use of good materials, first-class workmanship, frequent tests of the materials supplied, and an efficient inspection, with a permissible lowering of the factor of safety in consequence, as do good railway presidents and superintendents.

Consequently, it appeared to the writer that iron rods of the ordinary sizes, employed in roof-trusses, could not be deemed to possess more than two-thirds the strength of rods of the same diameter used in bridges. It then becomes evident, that when these rods are exposed to their maximum strain, caused by the greatest possible snow-load or wind-pressure, their real factor of safety is little more than 3, instead of 5, which it appears to be. This maximum strain may never occur, or at very distant intervals, so that a really smaller factor of safety can be used in roofs than in bridges, as the latter may receive a maximum load on the passage of every heavy train.

The resistance of the wood to crushing under the washer is much less affected by imperfect materials and workmanship than the tensile strength of the rods.

If the wood be not decayed or shaky, and the bearing surface be tolerably flat and nearly at right angles to the axis of the rod, it may be reasonably expected to safely resist four-fifths that pressure, which would commence to crush the average specimen. The indentation would be less than one-twentieth inch in depth. This maximum pressure but seldom occurs in roofs, but in bridges the pressure of the washers is materially increased every time a train passes, frequently producing a sensible impact against the wood, which necessarily increases its crushing effect. Moreover, bridge-trusses being much more exposed to the weather, water is likely to penetrate into every joint and to cause incipient dry-rot under many of the washers, which further lessens the resistance of the wood.

Considering all these things, it was deemed to be approximately correct, and in accordance with the actual state of affairs in the two kinds of constructions, to make the bearing area of washers in bridges double that used in roofs for rods of equal diameter and nominal strength.

The primary assumption on which Mr. Patton's criticism is based, is that rods of equal diameter possess equal strength as ordinarily used in roof and bridge trusses, and that the rods in the roof-truss may even be trusted to safely resist a strain fifty per cent greater than the maximum strain permitted on the bridge-rod, because this strain may seldom or never occur. The reasons just given show this assumption to be quite erroneous in ordinary practice. Were roofs constructed with the care and scientific skill now employed in the best bridge-work, the writer is perfectly willing to admit that the nominal factor of safety might be made for rods of roof-trusses, perhaps two-thirds that employed in bridges, with equal safety. Still, the bearing area of the washers need not be so great in roofs as in bridges, even in that event, because the effect of impact and the deterioration by dry-rot are much less.

In providing formulæ and tables to be employed for two different purposes, by two different classes of professional men, whose education has been carried out on different lines, attention must be paid to the manner in which they will probably be applied by architects and engineers, so as to ensure both safety and economy of material, so far as possible.

Should any one prefer to employ other values for factors of safety and resistances of wrought-iron and wood, it would take but a few days to compute a table adapted to the desired values, by means of the general formulæ given in the article referred to, and which are perfectly general. Yours truly, N. Clifford Ricker.

BOOKS ON ROMANESQUE ARCHITECTURE.

New York, October 23, 1883.

To the Editors of the American Architect: —

Dear Sirs, — In No. 408 I notice that you mention in an answer to "A. B. C," A. Levy, Astor Place, N. Y., for photographs on Romanesque architecture. Having such I suppose you wanted kindly to refer to me. I beg to let you know that my address is No. 4 Bond Street. I am also agent for Morel's works, but do not think I could import Revoil's "*Architecture Romanesque*" for $50, when it costs in Paris $60. However, I am willing to furnish it for about $65 unbound, and the same for Viollet-le-Duc's "*Dictionnaire d'Architecture.*" Yours truly, A. Levy.

To the Editors of the American Architect: —

Dear Sirs,— "*Monuments de l'Architecture Chretienne,*" par Henri Hubsch, Paris: 1866, is the title of what, so far as I know, is the best book on Romanesque architecture. It costs about $20, and can be ordered through any importing bookseller. It gives no Norman examples, but otherwise is very full. I recommend it to your inquiring friend. Very truly yours, Chas. Babcock.

AN ECONOMIC SUGGESTION.

Boston, October 25, 1883.

To the Editors of the American Architect: —

Gentlemen, — Apropos of the Atlanta State Capitol Competition, I trust you will do the profession at large a favor by ascertaining and publishing the names of the architects who respond to the invitation and furnish the drawings, etc., called for by the Commissioners; for, judging by my own experience, it would be cheaper to employ the gentlemen who are willing to work for something less than one-half of one per cent, and to get that only in case

drawings are accepted, than to pay salaries to draughtsmen, office-rent, etc., as is now customary with my professional brethren with whom I come in contact. Yours truly, W. W. L.

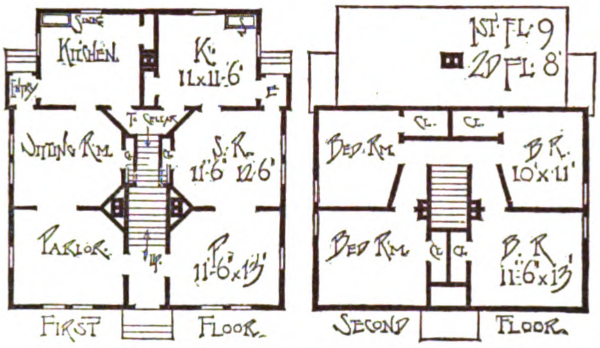
A THOUSAND DOLLAR DOUBLE-HOUSE.

DOVER, N. H., October 10, 1883.

To the Editors of the American Architect: —

DEAR SIRS, — I saw in your last issue J. T. B.'s letter of September 25, and, more in fun than anything else, I thought I would see what such a house as he calls for would cost, thinking of course that it would be impossible to build such a house for the sum named. But if J. T. B. will not find too much fault with the quality of stock and workmanship, he may possibly build such a house as I have drawn, providing that he can steal the plans and the profit of the builder.

Yours very respectfully, Charles E. Joy.



ESTIMATE FOR J. T. B's $1,000-HOUSE.

140 yds, excavation @ 25 c.	$ 35.00
670 sq. ft. stone wall @ 16 c.	107.20
8,000 brick all laid @ $12.	96.00
3,900 ft. frame, all raised @ $18	70.20
5,400 " hemlock boards all on @ $18	97.40
13 M. spruce shingles all laid @ $3.50.	45.50
1,300 spruce clapboards " " $30.	39.00
18 windows all finished complete, @ $4.	72.00
28 doors " " " " $4.	112.00
1,800 ft. upper floors all laid @ $26.	46.80
680 yds. plastering @ 13 c.	88.40
10,000 laths all on @ $3.75.	37.50
Plumbing, including sinks	15.00
Painting, two coats inside and outside	125.00
Nails	25.00
Other expenses	75.00
Total	$1,074.00

This estimate is based on prices prevailing here at the present time.

NOTES AND CLIPPINGS.

A House at Sea. — The building formerly owned and occupied by Professor Walter Smith at the corner of Q and Fourth streets, South Boston, Mass, has been moved to another site in a novel manner. This building is thirty-six feet wide and forty feet deep, with an L eighteen by twenty-seven feet. It is two and a half stories high, with a slated roof, back-plastered, and has five heavy chimneys extending ten feet above the roof, the weight of the building being about two hundred and sixty tons. It was placed on three large deck-scows and in one hour was towed around the Point to Ninth Street. The building was towed by the steam-tug *William H. Clark* while the wind was quite fresh.

Liability of Owner of Building. — A traveller in returning to his hotel before daylight after missing his train fell into an unguarded excavation in a sidewalk in front of a bank and sued the corporation to recover damages for his injuries. On the trial, (Faller *vs.* Citizens' National Bank,) in the United States Circuit Court for the Northern District of Ohio, it appeared that the cashier acting for the bank had let the work of making a vault for the bank to a contractor, who was to make the excavation and finish the whole work, no reservation being made of any control or direction over the contractor in its construction, or over the construction of the work, or the place where it was being constructed, or the mode of its execution, or the workman to be employed to do it. The compensation was a reasonable price by the day. Judge Walker, in his charge to the jury, said: — "This contract made the builder an independent contractor, and the defendant is not liable for his negligence in not providing suitable guards against danger to persons passing on the sidewalk. The mere fact that the contractor was to be paid a reasonable compensation for the work when completed, or was to be paid by the day, no fixed price being agreed on, does not of itself change his relation to the defendant; nor does the fact that the defendant was to furnish material with which the vault was to be constructed change the relation." — *Southern Trade Gazette.*

New Orleans Bridge. — A big bridge is projected at New Orleans. The Mississippi River there is 2,400 feet wide. An engineer proposes seven spans of 300 feet each, one to be a draw. The piers are to be creosoted piles, driven in clusters, and heavily capped and cased with iron. The depth of the water will be no obstacle, as the piles can be spliced. The estimated cost is $13,000,000.

The Portrush, Ireland, Electric Railway. — The electric railway from Portrush to the Giant's Causeway, Ireland, seems to have opened very auspiciously. The power to work the dynamo-electric machines costs little besides tear and wear of the machinery, a waterfall with a head of twenty-four feet in the River Bush setting in motion turbines which give an effective energy of about ninety horse-power. The line is only about six miles long, and has but a three-foot gauge. An underground cable conveys the electricity to the end of the rails. What defects exist on the road are two sharp curves and two steep grades. One foot in thirty-five will tell eventually on the rails and the rolling stock. — *Exchange.*

The Cincinnati Sketch-Club. — The architectural students and draughtsmen of Cincinnati have lately organized a sketch-club. There are now fifteen members of the club, and meetings are held once in two weeks, at which time each member must have at least one sketch of some architectural subject. The club is the outgrowth of a movement started some months ago by the architects of the city, allowing a half-holiday every Saturday to the young men, whereby it was hoped and expected that the students would visit houses in process of construction. So far the movement has proved beneficial alike to both scholar and teacher, as the former takes more interest in his work, and of course the latter reaps the material benefit of such increased interest.

Obituary. — James Baker, a well-known glass painter, who for many years devoted thought and means to improving glass for decorative purposes, died October 18th, in New York City, at the age of sixty years. He was at one time associated with the late C. Wenston, of England, whose full and comprehensive works on glass many are familiar with. He came to the United States in the year 1868, and soon commenced to improve the method of making stained glass. In 1876 he produced the first disc of colored glass, previous to which date only plain ruby glass had been made in this form by Mr. James Green, of Messrs. Powells, London, England. This occurrence marked the beginning of the present movement in the manufacture of stained glass in the United States, for as soon as it became known that such exquisite material could be obtained, those who had been using imported glass had their eyes opened, as it were, and soon discarded it for the improved bulls-eye disc glass. He further improved this glass by imparting to it a semi-opaque body, adding solidity to the already beautiful material. This action it was that led ultimately to the production of opalescent or crockery glass now so extensively used. It is in justice to his memory these remarks are made, as during life he cared little for the recognition his services merited; his sole aim was to achieve success in his search for hidden treasures of the art. Just prior to his death he had succeeded in producing a cameo or high relief glass, very different from anything now in use. The profession have thus lost a useful man who had a thorough knowledge of all that appertains to decorative glass; he was a good colorist, and a skilful draughtsman.

How to Prevent Smoke. — Professor Roberts, in discussing the smoke-abatement problem before a Parliamentary committee, said: — "M. Delezenne estimated in 1855 that the proportion of carbon that escaped combustion in this form might be taken at 5 per cent of the total weight of fuel burned in the grate, and 6,320 kg. of soot fell in twelve hours on the town of Lille. But, as Emile Burnat, quoting Payen, pointed out in a valuable paper on the combustion of smoke in boiler furnaces, the amount of finely-divided carbon produced in a certain lamp-black factory is only 3 per cent of the coal burned, and therefore the amount of carbon in ordinary smoke must be much lower. In 1858 Mr. John Graham estimated that very black smoke does not contain more than 0.1 per cent of the carbon of the coal burned, and the accurate experiments of M. Schewrer-Kestner showed that in boiler furnaces the loss of carbon in the form of soot never exceeds 1 per cent of the fuel burned, while the mean loss is probably between 1·2 and 3·4 per cent. A case, however, is recorded in which a coal containing 69 per cent of carbon (burned with an inadequate supply of air) thus lost an amount of carbon as soot equal to 2.03 per cent of the fuel burned. As might be anticipated, the amount of soot is greater in the case of an open fireplace than in a boiler furnace. But the evidence afforded by the results of tests made at the exhibition, while possessing much interest, does not, unfortunately, render it possible to give a precise answer to the question, for the following reasons: Some of the soot must have been deposited in the flue before it reached the point at which the withdrawing tube was inserted, and there is reason to fear that in the withdrawal of flue-gas laden with soot, through any form of slit or orifice in a tube, the gaseous and solid portions may not enter into exactly the ratio in which they exist in the chimney. In many cases the flues were carefully swept before and after the trial, and the soot collected and weighed. In an extreme case, in an open fireplace, no less than 2 1-4 per cent of soot, compared with the fuel burned, was found in the flue at the end of the trial. In the case of three close stoves of careful construction, rather less than 1-2 per cent was found, while in some cases it fell to 1-4 per cent, and in one case to 1-20 per cent. Of course, these numbers do not include the amount escaping into the air. I may perhaps add that in a preliminary experiment, made with an ordinary open fireplace, connected with a chimney by means of a sheet-iron pipe 6 feet long and 9 inches in diameter, 17 pounds of bituminous coal were burned in three hours, and no less than .61 per cent of the fuel burned was collected in the pipe in the form of soot, while the soot that passed into the chimney was not collected. This .61 per cent of soot, after drying at 100° C., yielded, on distillation at 300° C., 12 per cent of an oily, strong-smelling mixture of hydro-carbons."

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

286,990. VISE. — James O. Barrett, Erie, Pa.

286,995. VISE. — Charles M. Boyce, Stoneham, Mass.

287,012. ELEVATOR. — William Dutemple, Boston, Mass.

287,013. ENDLESS HOD-ELEVATOR. — Oliver N. Eaton, New York, N. Y.

287,021. LEVELLING-ROD. — William Gurley, Troy, N. Y.

287,039. SLIDING-DOOR PULL. — Thomas Lyons, Hartford, Conn.

287,055. WINDOW-VENTILATOR. — John G. Reinl, New York, N. Y.

287,058. FIRE-ESCAPE. — LaFayette Sawtelle, Lena, Ill.

287,065. DOOR-HANGER. — Sidney M. Stevens, De Kalb, Ill.

287,071. AUTOMATIC FIRE-EXTINGUISHER. — Caleb C. Walworth, Boston, and Osborn B. Hall, Malden, Mass.

287,099. STEAM-RADIATOR ATTACHMENT. — Richard T. Crane, Chicago, Ill.

287,122. STEAM AND HOT-WATER RADIATOR. — Johannes Haag, Augsburg, Bavaria, Germany.

287,142. FIRE-ESCAPE. — Charles J. Lung, Rochester, N. Y.

287,145. SPACING-INSTRUMENT. — James O. Madison, New York, N. Y.

287,149. RADIATING-DRUM FOR HOT-AIR FURNACES. — Jacob Miller and Daniel Mager, Allentown, Pa.

287,158. SHUTTER-FASTENER. — Samuel Poole, Brooklyn. N, Y.

287,179. AUTOMATIC FLUSHING-TANK. — Michael Sexton, New York, N. Y.

287,193. PIPE-WRENCH. — James L. Taylor, Ishpeming, Mich.

287,194. REVOLVING WRENCH. — Samuel A. Thomas, Charleston, Mo.

287,219. HATCHWAY-PROTECTOR FOR ELEVATORS. — Robert T. Bean, Mount Sterling, Ky.

287,225. WATER-CLOSET. — William P. Buchan, Glasgow, County of Lanark, Scotland.

287,230. TWO-ROOM-HEATING FIRE-BACK AND FRAME. — Jas. H. Burnam, Fayetteville, Tenn.

287,233. FIRE-ESCAPE. — William S. Cassedy, Kelly's Station, Pa.

287,245. WEATHER-STRIP. — Peter Cool, Manhattan, Kans.

287,246. SINK. — George Frederick Coomber, Kansas City, Mo.

287,257. FIRE-ESCAPE. — Dennis P. Edgar, Jackson, Mich.

287,271. VISE. — Porter A. Gladwin, Boston, Mass.

287,286. LIGHTNING-ROD JOINT. — Wm. Hewitt, London, Ontario, Can.

287,287. SAFETY-APPLIANCE FOR ELEVATORS. — John Hodges, Westfield, N. J.

287,342. LEVEL. — Lawrence Van Alstyne, Sharon, Conn.

287,357. FAUCET. — William A. Babcock, South Coventry, Conn.

287,369. MERCURY-SEAL TRAP FOR LAVATORIES, BATH-TUBS, ETC. — Abraham Edwards, Asbury Park, N. J.

287,371. JOINER'S PLANE. — William B. Fenn, Meriden, Conn.

287,373. TILE-HEARTH OR VESTIBULE-FLOOR. — Isaac L. Frankem, Indianapolis, Ind.

287,378. PIPE-TONGS AND CUTTER. — Henry Herbert, Cincinnati, O.

SUMMARY OF THE WEEK.

Baltimore.

DEPOT AND STABLES. — Messrs. Wyatt & Sperry, architects, have prepared drawings for the Pikesville Dairy Co., for a two-st'y brick depot and one-st'y brick stable, 40' x 140', cor. Argyle Ave. and Smith St.

CONSERVATORY.—The same architects have prepared plans for Chas. J. Bonaparte, Esq., for a conservatory, cor. Park Ave. and Centre St.; Mr. Anderson, builder.

BUILDING PERMITS. — Since our last report seventeen permits have been granted, the more important of which are the following: —

Shadrach & Romney, 4 three-st'y brick buildings, e s Chester St., between Fayette and Orleans Sts.

Jas. E. Cochran, 3 three-st'y brick buildings, e s Druid Hill Ave., between Robert and Presstman Sts.

V. H. Freaner, two-st'y brick building, n s Vine St., between Stricker and Gilmor Sts.

Estate of Isaac Lobe, 2 three-st'y brick buildings, w s Gilmor St., between Lanvale and Townsend Sts.

Oliver S. Firor, 3 two-st'y brick buildings, n s Ramsey St., e of Addison Alley.

Geo. C. Hershman, 6 three-st'y brick buildings, s s Fairmount Ave., s e cor. Bankard Alley.

Geo. Walz, two-st'y brick building, w s Belair Ave., n of Chester St.

Wm. J. Spillman, 12 two-st'y brick buildings, n s Federal St., between Barclay St. and Carter Alley; 12 two-st'y brick buildings, s s Pinkney Place, between Barclay St. and Carter Alley; 12 two-st'y brick buildings, n s Pinkney Place, between Barclay St. and Carter Alley; and 11 three-st'y brick buildings, s s Lanvale St., between Barclay St. and Carter Alley.

D. & C. S. Streett, two-st'y brick warehouse, 30' x 48', n e cor. Hillen and East Sts.

Jos. Friedenwald, three-st'y brick building, w s Holliday St., between Saratoga and Lexington Sts.

There is no change in the labor market report for November, and none likely to occur the winter through.

Boston.

BUILDING PERMITS. — *Wood.* — *Skinner St.*, near South St., Ward 23, for Henry N. Turner, dwell., 26' x 32' 8", two-st'y pitch.

Savin Hill Ave., near Pleasant St., Ward 24, for Edward McKechnie, dwell., 29' 9" x 33', two-st'y pitch; Edward McKechnie, builder.

Western Ave., near North Harvard St., Ward —, for Glidden, Joy & Co., factory, 15' x 20' and 25' x 60', one-st'y flat.

Boylston Ave., near Green St., Ward 23, for Patrick Shehan, dwell., 22' x 30', two-st'y pitch.

Boylston Ave., near Green St., for John Heelens stable, 15' x 20', one-st'y pitch.

Edwards Court, cor. Rutherford Ave., Ward 5, for James H. Hall Estate, stable, 25' x 30', two-st'y flat.

Skinner St., near South St., Ward 23, for H. J. Dame, dwell., 24' x 30', two-st'y pitch; G. Dame, builder.

Chestnut Hill Ave., near Mt. Vernon St., Ward 25, for Jas. A. Hatheways, stable, 18' x 40' and 40' x 45, one-st'y mansard; Benjamin Woods, builder.

North Beacon St., rear, cor. Everett St., Ward 25, for Mrs. Sarah W. Whiting, stable, 28' x 30', one-st'y pitch.

Unnamed St., off Centre St., Ward 23, for Mrs. Caroline E. Lewis, dwell., 27' x 30', two-st'y pitch; Holbrook & Harlow, builders.

Unnamed St., off Centre St., Ward 23, for Mrs. Caroline E. Lewis, dwell., 34' x 34', two-st'y pitch; Holbrook & Harlow, builders.

Rutherford Ave., opposite Furbush Court, Ward 5, for David Whiting & Sons, milk-shed, 17' and 20' x 200', one-st'y flat; C. O. Stone, builder.

Rutherford Ave., rear, opposite Winchester St., Ward 5, for Samuel and Richard Lombard, storage, 20' x 75', one-st'y pitch; N. T. Hanson, builder.

Iliad St., near Cottage St., Ward 20, for Wm. Donaldson, 2 dwells., 20' and 22' 6" x 29'; 2 dwells., 23' 6" x 30', two-st'y pitch; Wm. Donaldson, builder.

Brooklyn.

BUILDING PERMITS. — *Ellery St.*, n s, n w cor. Beaver St., 10 three-st'y frame double tenements, tin roofs; owners, J. Rueger and V. Weisensee, 250 Moore St.; builder, J. Rueger.

Twenty-seventh St., n s, 280' w Fourth Ave., 2 three-st'y brick tenements, felt and gravel roofs, cost, each, $3,500; owner, Michael Kinney, 202 Twenty-first St.; builder, Chas. Long.

Lorimer St., w s, 170' s Norman Ave., 4 three-st'y frame tenements, gravel roofs; cost, total, $18,000; owner, Jas. Bostwick, 112 Norman Ave.; architect, F. Weber; builders, J. & J. Van Riper and A. J. Hulse.

Putnam Ave., Nos. 350 *to* 358, s s, w of Marcy Ave., 5 three-st'y brownstone front dwells., tin roofs; cost, each, $5,500; owner, architect and builder, T. W. Swimm, 389 Putnam Ave.

Classon Ave., w s, 25' s Park Ave., three-st'y brick factory, tin roof; cost, $4,200; owner, J. W. Court, 342 Kent Ave.; architect, S. Harvey; builders, Thos. Baker and Alexander McKnight.

Fulton St., n s, 194' 8" e Grand Ave., 8 four-st'y brick, stone front stores and tenements, tin roofs; cost, each, $10,000, owner of two, W. H. Aldrich, 1855 Fulton St.; owner of the remaining six, B. B. Thornell, Madison Ave., cor. Eighty-first St., New York City; architect, Robert Dixon; builder, W. H. Aldrich.

Atlantic Ave., s s, 100' e Franklin Ave., two-st'y brick double tenement, tin roof; cost, $4,200; owner, Jno. J. Drake, 77 Lexington Ave.; architect, A. D. Howe; builders, Philip Sullivan and Wm. Brown.

Vanderbilt Ave., No. 319, two-st'y brick stable, tin roof; cost, $2,600; owner, J. O. Mahones; architect, R. B. Eastman; builders, Long & Barnes.

Hancock St., s s, 280' e Nostrand St., three-st'y brownstone front dwell., tin roof; cost, $10,000; owner and builder, H. A. Weed, 243 Putnam Ave.; mason, Geo. Phillips.

Willoughby Ave., s s, 245' w Broadway, four-st'y brick double tenement, tin roof; cost, $10,000; owner, B. J. Warner, 81 Morton St.; architects, Parfitt Bros.; builders, W. & T. Lamb, Jr., and Cardwell & Hawkins.

Gates Ave., n s, 162' e Franklin Ave., three-st'y brick dwell., tin and slate roof; cost, $12,000; owner, Geo. A. Bell; architects, Parfitt Bros.; builders, J. Ashfield & Son and Martin & Lee.

Lewis Ave., s w cor. Bainbridge St., three-st'y brick dwell., felt and gravel roof; cost, $6,500; owner, E. J. Granger, 123 MacDonough St.; architect, A. Hill.

Lewis Ave., w s, 20' s Bainbridge St., 5 two-st'y brick dwells., felt and gravel roofs; cost, each, $5,000; owner and architect, same as last.

North Seventh St., No. 95, n s, about 100' from Second Ave., four-st'y frame double tenement, tin roof; cost, $4,700; owner and builder, Henry Richers, 44 North Second St.; architects, Rentz & Wirz.

North Seventh St., No. 95, n s, about 100' from Second Ave., on rear, four-st'y frame double tenement, tin roof; cost, $3,200; owner, etc., same as last.

Wallabout St., n s, 100' e Wythe Ave., 9 three-st'y brick dwells., tin or gravel roof; cost, each, $3,000; owner, architect and builder, D. H. Brown, 143 Bedford Ave.; mason, Matthew Smith.

Boerum Pl., No. 29, four-st'y brick store and dwells., tin roofs; cost, $7,000; owner, Sarah Brien, Schermerhorn St.; architect, C. F. Eisenach; builders, Thomas Donlon and Conrad Dietrick.

Pleasant Pl., n e cor. Atlantic Ave., 7 two-st'y frame, gravel roofs; cost, each, $2,700; owner, G. H. Bishop, 49 Broadway, New York City; architect, G. H. Chamberlain; builder, Wm. Wright.

Pulaski St., s s, 80' e Marcy Ave., two-st'y brownstone private dwell., tin roof; cost, $4,500; owner, R. G. Fowler, Marcy Ave., cor. Pulaski St.; builder, A, Miller.

Ellery St., No. 33, two-st'y frame stable, tin roof; cost, $2,500; owner, Anton Miltner, 30 Hopkins St.; architect, John Platte; builder, C. Wilber.

Quincy St., n s, 212' e Tompkins Ave., 3 two-st'y brownstone front dwells., tin roofs; cost, each, $4,000; owner, architect and builder, G. De Revere, 663 Greene Ave.

Bleecker St., n s, 21' w Evergreen Ave., 4 two-st'y frame tenements, tin roofs; cost, each, $3,000, owner, J. Menahan, Thirty-first St., near Sixth Ave., New York City; architect, F. Weber, builder, Thos. Goodwin.

Park Ave., s w cor. Spencer St., 2 four-st'y brick stores and tenements, tin roofs; cost, total, $13,925; owner, Walter Mayer, 150 Spencer St.; architect, H. Hollwedel; builder, Thos. Baker.

Fayette St., No. 12, s s, 100' e Broadway, three-st'y frame store and tenement, tin roof; cost, $4,500; owner, architect and builder, T. Engelhardt, 14 Fayette St.

ALTERATIONS. — *Third Ave.*, n w cor. Fifteenth St., six buildings raised three feet; cost, total, $3,0 0; owner, Edward Kane, 6 President St.; house-movers, B. C Miller & Son.

South Fifth St., n s, 45' w second St., raised one st'y, also four-st'y brick extension, front rebuilt; cost, $9,000; owner, Geo. Young, First St., near South Fourth St.; architect, E. F. Gaylor; builders, Jas. Rodwell and R. B. Ferguson.

Greenpoint Ave., No. 35, two-st'y brick extension, tin roof; cost, $3,000; owner, A. H. Hubbers, on premises; architect, C. Dunkhose; builder, M. Vogel.

Buffalo, N. Y.

CHURCH. — Emanuel's Reformed Church, cor. Humboldt, Parkway and Utica Sts., frame; cost, $1,6 0.

FACTORY. — Addition to wall-paper factory of M. H. Birge Sons & Co., cor. Maryland and Niagara Sts.; cost, $6,000; architect, J. G. Cutler.

HOUSES. — Brick dwell., Delaware St., near Utica St.; cost, $11,000; owner, W. J. Donaldson; contractors, J. H. Tilden and J. W. Carroll.

Double brick dwell., for Dr. Geo. E. Fell, Prospect Ave.; cost, $9,500; architects, Caulkins & Co.

Residence, cor. Delaware and Tupper Sts., remodelling; cost, $18,0 0; owner, W. H. Walker; architect, R. A. Waite.

Double brick dwell., Niagara St., near Virginia St.; cost, $9,500; owner, S. L. Talcott.

Additions to Church Home, Rhode Island St.; cost, $5,000; architects, Silsbee & Marling.

STABLE. — Stone and frame stable for Geo. H. Lewis, cor. Connecticut St. and Front Ave.; cost, $6,000; architect, James G. Cutler.

STORE. — Main St., near North Division St., double store, brick and brownstone; owners, M. Messmer and Mrs. S. J. Birdsall; cost, $22,500; architect, Geo. J. Metzger.

Chicago.

FACTORY.—J. M. Van Osdel & Co., architects, planned the furniture factory for E. H. Shirk, on Canal St., s of Harrison St., five-st'y, 88' x 150'; cost, $45,000.

FLATS. — J. M. Van Osdel & Co., architects, have completed plans for flats for E. H. Gammon, on Monroe St., near Morgan St., three-st'y, Bedford stone front; cost, $10,000.

The same architects planned the flat for A. B. McCourtie, on Park Ave., near Hoyne St., three-st'y, 30' x 65'; cost, $8,000.

HOUSES. — Burnham & Foot are architects for two-st'y house, stone front, 47' x 70', for Joseph Frank, on Michigan Ave., between Thirty-third and Thirty-fourth Sts.

J. M. Van Osdel & Co. are architects for 2 three-st'y houses on Ashland Ave., for S. D. Stanbro; cost, $9,000 each.

The same architects planned a dwell for Mrs. Spry, cor. Monroe and Loomis Sts., three-st'y, 33' x 76'; cost, $25,000.

J. M. Van Osdel also planned dwell. for J. M. Adsit, cor. Dearborn Ave. and Elm St., three-st'y, 34' x 55'; cost, $35,000.

Same architects made plans for B. L. Crumb's house, cor. of Adams and Leavitt Sts., two-st'y, 25' x 46', brownstone front; cost, $7,000.

OFFICE-BUILDING. — J. M. Van Osdel & Co., architects, have completed plans for the office-building for J. D. Parker, six-st'y, 50' x 100', first st'y of McArthur brownstone, upper stories faced with Anderson pressed-brick, to be fire-proofed by the Ottawa Tile Co.; cost, $100,000.

WAREHOUSE. — J. M. Van Osdel & Co. planned the warehouse for Ewing Estate, on Milwaukee Ave., near Lake St., three-st'y; cost, $12,000.

BUILDING PERMITS.—S. V. Clark, 2 three-st'y dwells., 69 and 71 Pine St.; cost, $15,000; architect, J. J. Egen, builder, Jno. McGinnis.

P. Kalteux, three-st'y dwell., 369 Ashland Ave.; cost, $4,500.

W. Gastfield, three-st'y store and dwell., 416 West Chicago Ave.; cost, $5,000.

D. O'Donnell, two-st'y and basement dwell., 606 Taylor St.; cost, $3,000.

P. Quirk, two-st'y store and dwell., 565 West Indiana St.; cost, $3,000.

John D. Parker, six-st'y office building, 6 and 8 Sherman St.; cost, $100,000; architect, J. M. Van Osdel.

G. Payson, three-st'y dwell., 454 Dearborn Ave.; cost, $5,000; architect, C. P. Thomas; builder, N. Gerten.

Marks & Cohn, four-st'y store and flats, 125 East Chicago Ave.; cost, $15,000; architect, J. Starbuck; builder, Jno. Petrow.

H. McHatton, 3 three-st'y flats, 322 to 326 Mohawk St.; cost, $18,000; architect and builder, N. E. Martin.

Western Indiana R. R. Co., three-st'y flats, 2 8 Fourth Ave.; cost, $8,000; architect, Jno. Wagner.

A. C. Wakeman, two-st'y dwell., 380 Warren Ave.; cost, $6,000.

J. K. Russell, addition to factory, 90 and 92 Fulton St.; cost, $4,000.

Dr. H. S. Sloan, two-st'y and basement dwell., 498 West North Ave.; cost, $5,000.

Thos. Parcell, four-st'y store and dwell., 153 West Twelfth St.; cost, $7,000; architect, Ruehl.

McGraw & Downey, repair theatre; cost, $30,000.

David Hogg, three-st'y dwell., 399 Oak St.; cost, $5,000.

Alex. D. Hannah, three-st'y dwell., 409 Oak St.; cost, $5,000.

U. P. Smith, two-st'y dwell., 3232 Groveland Park; cost, $10,000.

Jno. Lawler, three-st'y store and flats, 189 Wells St.; cost, $7,000.

E. L. Brand, four-st'y store-building, 73 and 75 East Jackson St.; cost, $15,000; architect, Adler; builder, J. F. Barney.

A. Plamondon, 2 two-st'y dwells., 411 and 413 West Monroe St.; cost, $10,000.

R. S. Critchell, three-st'y dwell., 106 Centre Ave.; cost, $6,000.

J. W. Mills, two-st'y dwell., 903 West Monroe St.; cost, $7,000.

A. Holpech, three-st'y store and dwell., 661 Throop St.; cost, $5,500; architect, F. Kelteneeh.

Mrs. Julia Decreet, two-st'y dwell., 3654 Forest Ave.; cost, $5,000; architect, G. Viegant.

D. B. Scully, 5 two-st'y dwells., 66 to 74 Sheldon St.; cost, $20,000; architect, G. Vigeant; builder, Aug. Kaiser.

Wm. Grace, three-st'y store and dwell., 3448 Wentworth Ave.; cost, $5,500; architects, Cobb & Frost.

McKee & Tuthill, three-st'y store and flats, 2013 and 2015 State St.; cost, $13,000; architect, J. R. Willett; builder, Wm. Grace.

Jas. Kirkland, three-st'y flats, State St., cor. Huron St.; cost, $35,000; architect, Jno. N. Tilton.

Mrs. M. C. Sands, 6 two-st'y dwells., 739 to 749 Harrison St.; cost, $15,000.

G. D. Baldwin, two-st'y dwell. and barn, 2925 Prairie Ave.; cost, $15,000; architects, Burnham & Root, builder, E. Sturtevant.

W. H. White, three-st'y dwell., 423 East Superior St.; cost, $7,000; architects, Treat & Foltz; builder. Geo. Gries.

J. Reider, two-st'y store and dwell., 342 Lincoln Ave.; cost, $4,000.

Cincinnati.

BUILDING PERMITS. — Lars Anderson, five-st'y brick store on Pearl St., between Race and Elm Sts.; cost, $25,000.

L. Razelle, two-st'y frame dwell., Euclid Ave., near Auburn St.; cost, $3,800.

E. Coombe, two-st'y brick dwell., s e cor. Bigelow and Carmalt Sts.; cost, $6,000.

E. Coombe, two-st'y brick dwell., s w cor. Josephine and Carmalt Sts.; cost, $6,000.

M. Werke, three-st'y brick building, Ninth St., near Vine St.; cost, $3,000.

J. Bierbaum, two-st'y brick building, Dayton St., cor. Western Ave.; cost, $2,600.

John F. Winslow, three-st'y brick store and dwell., Gilbert Ave., near McMillan St.; cost, $10,000; J. W. McLaughlin, architect.

Dr. F. Brunning, three-st'y brick building, Gilbert Ave., near McMillan St.; cost, $5,500.

T. J. McCoy, two-st'y brick dwell.; cost, $5,000.

D. Harris, two-st'y brick building, Findlay St., near Freeman Ave.; cost, $3,500.

Wm. R. Teasdale, 2 two-st'y brick buildings, Lincoln Ave., near Lane St.; cost, $8,000.

Enterprise Carriage Manufacturing Co., seven-st'y brick factory, cor. Court and Sycamore Sts.; cost, $18,000.

Twenty-one permits for repairs; cost, $13,000.

New York.

APARTMENT-HOUSE. — For Mr. W. J. Gessner, a five-st'y brownstone apartment-house, 25′ x 68′, is to be built on the west side of Fourth Ave., 75′ s of Eighty-eighth St., at a cost of about $18,000, from designs of Messrs. Thom & Wilson.

WAREHOUSE. — For Messrs. Phillip Strobel & Sons, a seven-st'y warehouse and store, Philadelphia face-brick and iron front, is to be built at Nos. 53 and 55 Elizabeth St., from designs of Mr. Albert Wagner; cost, about $50,000.

BUILDING PERMITS. — *Ave. A, No.* 1428, five-st'y brick tenement and store, tin roof; cost, $13,000; owner, Mathius H. Schneider, 1455 Ave. A, and Philip Lott; architect, Julius Kastner.

Riverdale Ave., w s, 150′ s Beach St., three-st'y frame dwell., slate and tin roof; cost, $2,550; owner, Michael Harrigan, Riverdale; architect, M. H. Couzens; builders, Daniel Harrigan & G. W. Varian.

Church St., e s, 150′ n Weber's Lane (Kingsbridge), two-st'y frame stable and carriage-house, shingle roof; cost, $2,000; owner, John Weber, Kingsbridge; builders, J. Weber and S. Berrian.

Eighty-sixth St., n s, 90′ w Tenth Ave., two-st'y brick and stone chapel, slate roof; cost, $20,000; owner, Eighty-fourth-street Presbyterian Church, Geo. P. Freeman, Chairman of Building Committee, 48 Elizabeth St.; architect, Leopold Eidlitz; builders, L. N. Crow and Maguire & Sloan.

Fifty-first St., n s, 125′ w First Ave., 2 five-st'y brick tenements, tin roofs; cost, each, $15,000; owners, Irwin & Smith, Ave. B, between Eighty-fourth and Eighty-fifth Sts. architect, Wm. R. Smith.

Grove Ave., w s, 50′ s One Hundred and Sixty-third St., one-st'y frame dwell., tin roof; cost, $3,600; owner, Carrie S. Harron, One Hundred and Sixty-first St., cor. Jackson Ave.; architect, H. S. Baker; builder, R. L. Harron.

West Eleventh St., Nos. 349 *and* 351, four-st'y brick stable, gravel roof; cost, $20,000; owner, John B. Gaden, 402 West Fifty-first St.; architect, Wm. R. Smith.

St. Ann's Ave., w s, 50′ n One Hundred and Forty-eighth St., 3 two-st'y frame dwells., tin roofs; cost, each, $2,500; owner and builder, Fred Schwab, Tinton Ave., cor. One Hundred and Fifty-first St.; architect, Adolph Pfeiffer.

First Ave., n w cor. Eighty-eighth St., five-st'y brick flat and stores, tin roofs; cost, $14,441; owner, Thos. Patton, 227 Greenwich St.; architect, Geo. M. Huss; builders, Gilbert M. Platt and Grissler & Fausel.

First Ave., w s, 50′ 8½″ n Eighty-eighth St., five-st'y brick flat and store, tin roof; cost, $40,286; owner, Mary C. King, 226 Greenwich St., architect, Geo. M. Huss; builders, Gilbert M. Platt and Grissler & Fausel.

East Eighty-first St., No. 359, rear, two-st'y brick dwell., tin roof; cost, $3,000; owner, Henry Oelig, on premises; architect, William Fernschild; builders, Schwartz and L. Wirth.

Eighty-fourth St., n w cor. Lexington Ave., five-st'y brick flat, tin roof; owner, John Livingston, 981 Lexington Ave.; architect, F. T. Camp.

Fortieth St., s s, 225′ e First Ave., one-st'y brick gas-generating house and boiler-house, slate roofs; cost, $21,600; owner, Equitable Gas Light Co., Post Building, Exchange Pl.; architect, John F. Harrison, 231 Broadway; builder, Richard Deeves

East Eighth St., Nos. 401 *to* 417, five-st'y brick factory, tin roof; cost, $55,000; owner, John Roach, foot of East Ninth St.; architect, Wm. J. Tryer.

First Ave., No. 1148, five-st'y brownstone front flat and store, tin roof; cost, $16,500; owner, Eva Muller, 446 East Seventy-sixth St.; architect, John Brandt.

Alexander Ave., e s, 50′ n One Hundred and Forty-third St., two-st'y brick store, tin roof; cost, $4,500; owner, Robert Spink, 268 Bleecker St.; architect, John Brandt.

Eighty-eighth St., n s, 275′ w First Ave. 5 five-st'y brick tenements, tin roofs; cost, each, $8,000; owner, Laura Haensgen, 303 East Eighty-fourth St.; architect, Wm. Graul.

Fourth Ave., w s, 75′ 6″ s Eighty-eighth St., five-st'y brownstone front flat, tin roof; cost, $20,000, owner, Wm. J. Gessner, 1722 Madison Ave.; architects, Thom & Wilson.

West Fifty-ninth St., Nos. 303, 305 *and* 307, four-st'y brick stable, tin or gravel roof; lessee, O. L. Jones, 1215 Broadway; architect, M. C. Merritt.

Croton Ave., n e cor. Jerome Ave, three-st'y stone and frame dwell., shingle roof; cost, $10,000; owner, St. James Church, Fordham; Gustav Schwab, Chairman Building Committee, Fordham; architect, E. A. Sargent; builders, Jacob Rief & C. V. Folin.

West Thirty-eighth St., No. 542, three-st'y brick dwell., tin roof; cost, $5,000, owners, Patrick and James Kennedy, 439 West Thirty-sixth St.; architect, Chas. F. Ridder, Jr.

East Seventy-sixth St., No. 421, four-st'y brick dwell. and store, tin roof; cost, $9,500; owner, Isidor Jesser, 1371 Third Ave.; architect and builder, Wm. Fernschild & Son.

Seventy-eighth St., n s, 150′ w Ninth Ave., 6 three-st'y brownstone front dwells., tin roofs; cost, each $9,000; owner and architect, Christian Blinn, s w cor. Ninth Ave. and Seventy-ninth St.

Seventieth St., n s, 100′ w First Ave., five-st'y brick tenement and store, tin roof; cost, $12,000; owner, Thos. Maloney, 349 East Seventieth St.; architect, R. W. Buckley.

Fleetwood Ave., s w cor. One Hundred and Sixty-second St., 3 two-st'y frame dwells., tin roofs; cost, each $2,500; owner, Hedwig Hoffman, 697 Eighth Ave.; architect and builder, Louis Falk.

ALTERATIONS. — *East Fifty-ninth St., Nos.* 110 *and* 112, raise one st'y on rear part of building; cost, $5,000; owner, Progress Club, Maurice Lowy, President, 127 East Fifty-ninth St.; architect, E. Gruwl; builder, Chas. Eberspacher and Westbrook Myers.

West Thirty-first St., No. 443, rebuild front and rear walls, raise one st'y, and a four-st'y brick extension; cost, $8,000; owner, Robert A. Greacan, 445 West Thirty-first St.; architects, Youngs & Campbell.

Broadway, Nos. 537 *and* 539, repair damage by fire; cost, $80,875; owner, Estate of B. F. Beekman, John R. Vandemer, exr., 318 West Twenty-ninth St.; architect, Mettam; builder, Henry Wallace.

Philadelphia.

FACTORIES. — Messrs. S. B. and M. Fleisher are about to build, cor. Twenty-third and Hamilton Sts., main building to be six stories high, 58′ x 180′; office, shipping and engine-room building, 52′ 3″ x 67′; dye-house, 51′ 2″ x 68′ 2″; boiler and drying-house, 31′ 2″ x 38′ 3″.

BUILDING PERMITS. — *Norris St.*, between Fifteenth and Carlisle Sts., 10 three-st'y dwells.; W. F. Snyder, owner.

Tacony St., e s, s of Bridge St., 2 two-st'y dwells., 17′ x 20′; J. P. Yerkes, contractor.

Chester St., between Forty-seventh and Forty-eighth Sts., 4 three-st'y dwells., 26′ x 45′; Jas. D. Arthur, contractor.

Beach St., No. 1115, two-st'y addition to boat-shop, 30′ x 30′; Geo. Shepherd, owner.

Mifflin St., cor. Swanson St., two-st'y press-building, 31′ x 65′; two-st'y treating-room, 21′ x 31′; one-st'y coopering-house, 25′ x 75′; C. F. Pearce & Co.

North Front St., No. 926, stable, 15′ x 130′; Jno. K. Furman, contractor.

Lehigh Ave., between Richmond and Fisher Sts., 4 two-st'y dwells., one 16′ x 25′, three 14′ x 25′; Samuel Elliott, contractor.

Eleventh St., cor. Berks St., store, 10′ x 40′; Jacob R. Garber, contractor.

Pallas St., cor. Tasker St., three-st'y store and dwell., 15′ x 50′; J. K. McCullen, contractor.

Sepviva St., n of Erie Ave., two-st'y dwell., 14′ x 38′; D. C. Schuler, contractor.

Johnson St., w of Main St., 2 three-st'y dwells., 18′ x 44′; Jno. Snowden, owner.

Market St., No. 1021, five-st'y store, 28′ x 158′; Jacob Myers, contractor.

Fifteenth St., cor. Hamilton St., three-st'y back building to factory, 40′ x 40′; E. S. Matlock, owner.

North Tenth St., No. 661, three-st'y dwell., 18′ x 25′; Martha Snyder, owner.

Sutherland Ave., w s, n of Christian St., boiler-house, 15′ x 32′; J. P. Turley, contractor.

Kensington Ave., No. 2650, three-st'y store and dwell., 18′ x 45′; F. P. Stephens, owner.

South St., between Seventy-second and Seventy-third Sts., two-st'y dwell., 22′ x 54′; Jno. Welsh.

Church St., w of Wood St., second-st'y addition to shop, 20′ x 70′; Ellen Schofield.

Tioga St., n w cor. Lewis St., two-st'y dwell., 18′ x 50′; Jos. Henhoeffer, owner.

Christian St., No. 1708, three-st'y dwell., 18′ x 55′; Jno. McConaghy, contractor.

East Jackson St., No. 706, two-st'y dwell., 15′ x 32′; Jno. Zoelle, contractor.

Weightman's Works, Falls Schuylkill, car-house, 50′ x 50′; Powers & Weightman, owners.

Clearfield St., e of Sixteenth St., second story to shop, 25′ x 50′; H. A. Miller, contractor.

Juniata St., cor. Ruhl St., four-st'y addition to factory, 38′ x 40′; A. M. Green, contractor.

Supplee St., s s, between Fifty-fourth and Fifty-fifth Sts., three-st'y factory, 58′ x 112′; N. R. Yewdall.

St. Louis.

BUILDING PERMITS. — Thirty-nine permits have been issued since our last report, eighteen of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

J. C. Fink, three-st'y brick warehouse; cost, $6,000; Kledus, architect; contract sub-let.

A. Bollinger, two-st'y brick dwell.; cost, $3,000; Brady, architect; A. Bollinger, contractor.

Wainwright Brewery Co., two-st'y brick brewery; cost, $139,762; E. Jungenfeld, architect; contract sub-let.

Peter Roemer, two-st'y brick dwell.; cost, $4,000; I. Stock, contractor.

Thomas Thomsen, two-st'y brick dwell.; cost, $3,000; A. Beinke, architect; Remmers & Thomsen, contractors.

St. Louis & San Francisco Railway Co., one-st'y brick roundhouse; cost, $15,000; contract sub-let.

Sam. Marlow, brick dwell.; cost, $3,500; Charles May, architect; P. Riecher, contractor.

General Notes.

ALBERT LEA, MINN. — The proposition of Freeborn county issuing bonds in the sum of $40,000, for the purpose of building a court-house, will be voted upon at the approaching election.

BLOOMFIELD, CONN. — The Congregational Society has plans drawn for a frame parsonage; cost, $3,000; Palliser, Palliser & Co., architects, Bridgeport.

BRIDGEPORT, CONN. — Two brick school-houses for the city; cost, $34,000; Warren R. Briggs, architect.

District school-house; cost, $2,000; Warren R. Briggs, architect.

House and stable for E. Parmly, Esq.; cost, $15,000; Warren R. Briggs, architect.

The Bridgeport Brass Co. is building a factory, 35′ x 150′, three-st'y brick.

BUCYRUS, O. — House and barn for H. W. McDonald; cost, $5,000; Palliser, Palliser & Co., architects, Bridgeport, Conn.

DES MOINES, IO. — B. L. Harding will erect an elevator, 60′ x 114′, and 93′ high. It will have a capacity of 500,000 bushels of grain, and will cost $50,000.

EASTON, MASS. — The shop to be built by D. B. Closson, will be 35′ x 135′, and four stories.

ELIZABETH, N. J. — In answer to the advertisement of the Board of Education recently published in the *American Architect*, seventeen architects sent in plans, and the $150 premium was awarded to Palliser, Palliser & Co., of Bridgeport, Conn., who are now preparing working plans and specifications, and the building is to be started as soon as possible.

FAIRHAVEN, MASS. — Grammar-school building for H. H. Rogers, Esq.; cost, $80,000; W. R. Briggs, architect, Bridgeport, Conn.

LONG BRANCH, N. J. — Philadelphia pressed-brick and terra-cotta store; cost, $10,000; A. L. Hartwell, architect.

NEWPORT, R. I. — A stable, to be built of stone and wood, and to cost about $10,000, is to be built for Mr. F. A. Stout; Mr. H. R. Marshall, of New York, architect.

SOUTHPORT, CONN. — Barn for John H. Perry, Esq., cost, $3,000; W. R. Briggs, architect, Bridgeport.

STAMFORD, CONN. — House for F. S. Weston, Esq.; cost, $17,000; W. R. Briggs, architect, Bridgeport.

House for W. C. Harding, Esq.; cost, $20,000; W. R. Briggs, architect, Bridgeport.

Coachman's cottage for Geo. A. Hoyt, Esq.; cost, $2,500; W. R. Briggs, architect, Bridgeport.

TARRYTOWN, N. Y. — A $14,000 frame dwell. is to be built for Mr. Wm. C. Casey, from designs of Mr. H. R. Marshall, of New York.

TAUNTON, MASS. — High-school building for the city; cost, $60,000; W. R. Briggs, architect, Bridgeport, Conn.

WEATHERLY, PA. — Jos. Cassler, cottage; cost, $2,500; Palliser, Palliser & Co., architects, Bridgeport, Conn.

YONKERS, N. Y. — Dr. Robert Stone is having a large country house built here: cost, $15,000; J. D. Brown, builder; Palliser, Palliser & Co., architects, Bridgeport, Conn.

A frame residence, to cost $18,000, is to be built for Mr. F. N. Bangs, from designs of Mr. H. R. Marshall, of New York.

Bids and Contracts.

FRAMINGHAM, MASS. — The contract for furnishing piles and timber work for use at Farm Pond has been awarded to George H. Cavanaugh of Boston for $26,551.

KANSAS CITY, MO. — The following is a synopsis of the bids for slating roofs of public building, opened October 22, 1883: —

Dalton, Bulgert & Co., $1,993.
William Hall & Sons, $2,665.
T. F. & J. A. Hayden, $1,950.
Knisely & Miller, $2,038.

MEMPHIS, TENN. — The following is a synopsis of the bids for heating apparatus, opened October 22, 1883: —

I. D. Marshbank & Son, $14,152.
S. I. Pope & Co., $24,879.
Thomas E. Basshor & Co., $17,750.
Bartlett, Hayward & Co., $15,400.

MOSQUITO INLET, FLA. — The following is an abstract of the bids for building a light-house at Mosquito Inlet, Fla., opened October 16, 1883:

I. P. Morris Company, Philadelphia, metal work, $11,750; wages of mechanics, $5 per day (*accepted*).

Tanner & Delaney Engine Company, Richmond, metal work, $11,950; wages of mechanics, $2.50 and $3 per day.

Phœnix Iron Company, Trenton, N. J., metal work, $15,000; wages of mechanics $3 to $4 per day.

West Point Foundry Association, Cold Spring, N.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

THE first day of November was signalized in New York as the date of the adoption of a new schedule of rates by the members of the Board of Fire Underwriters, applicable to all buildings within the so-called "dry-goods district." One of the most important of the new rules requires that shutters of iron or other fire-proof material, approved by the Committee on Surveys, shall be placed either inside or outside of all windows except the front windows of the first story. The shutters are in all cases to be set at least four inches from any woodwork, and those on the front of the building are to be arranged to open from the outside. In cases where no suitable shutters are provided for rear or side windows not opening on a street, ten cents will henceforth be added to the premium rate, and buildings situated upon streets forty feet or less in width, without shutters to the front windows, will be subjected to an increase in the premium charge of fifteen cents. Buildings facing upon streets more than forty feet, but not over sixty feet in width, will be charged a rate of ten cents for dispensing with front shutters, and an increase in the width of the street to more than sixty feet will reduce the penalty to five cents. Why the first-story front windows should be excepted from the general requirement of shutters it is not easy to see, but the new rule will undoubtedly have its effect in promoting the security of such structures. It is worth remarking that the New York building law has for many years required that all mercantile structures should be fortified with fire-proof shutters to every window, except, we believe, the first-story front openings; adding, moreover, the command that all shutters should be securely closed at the end of each business day; but the letter of the law has always been waived so far as to allow stores upon streets forty feet or more in width to be built without any shutters to the front windows.

ANOTHER custom, quite common among careful real-estate owners, is sanctioned under the new insurance rules by an addition of ten cents to the premium rates for buildings not constructed in accordance with it. This is the useful practice of carrying up party-walls five feet above the roof, with loop-holes for the use of men engaged on one side in fighting a fire on the other. In the matter of elevators, which, as sources of loss in conflagrations, deserve more serious attention than any other detail of building, the recent schedule prescribes an addition of ten cents to rates for hatchway-openings not provided with trap-doors, and of twenty cents for open elevators. What the distinction may be between a hatchway and an open elevator we will not undertake to say, but we are glad to see that the cost of either is to be increased, through the addition to the insurance rates, sufficiently to make its use unprofitable. Skylight openings, not protected by iron trap-doors or heavy flooring-glass, will involve the same increase in rates as hatchways; and automatic sprinklers are so far recognized as useful in preventing fires that ten cents will be deducted from the standard rates where they are employed. This, which would indicate that the sprinklers diminish the risk of loss by fire only to the extent of about one-tenth, seems to be very far from a fair estimate of their value to the underwriters, but insurance companies find it advantageous to be always a little blind to the merits of safeguards against fire, and we can hardly look for more from them than a reduction of premium barely sufficient to make their introduction profitable. In the case of the New York dry-goods district, moreover, no dependence could be placed upon the Croton pressure for operating the sprinklers in case of need, and the tanks necessary to supply its place might not receive the care that a mill superintendent would give them.

THE appointment of Mr. Mifflin E. Bell of Iowa as Supervising Architect of the Treasury Department, to succeed the retiring incumbent, Mr. James G. Hill, will, we think, give general satisfaction to the profession and the public. Mr. Bell is a comparatively young man, being only thirty-six years of age, but, as principal assistant of the late Mr. Piquenard, he has had an extensive experience of building operations on a large scale, and for some years was in charge of the work upon the Illinois and Iowa State-houses. He has the reputation of great thoroughness in his work, and certainly no quality could better fit him for the great and complex business of the Government office; while, as an architect, he is said to possess both the ambition and the ability necessary for success.

THE *Iron Age* comments upon the fact that notwithstanding the immense increase during the last few years in the volume of building operations in New York, the business of the so-called "architectural iron foundries," which furnish castings for building work, has steadily declined. The cause of the decline is to be found principally, it thinks, in the general distrust of cast-iron as a fire-resisting material, which has led to the adoption of brick for the fronts of a great number of the most costly business structures in the city. The influence of the Department of Buildings has also, whether intentionally or not, tended to discourage construction in iron, as much by its singular interpretation of the law, in subjecting iron fronts to the rules in regard to thickness originally provided for brick or stone walls, as by a certain passive resistance to anything like originality or novelty in such matters. Although there is something to be said in favor of the general substitution of heavy masonry for the metallic framework which was regarded ten years ago as the type of the common mercantile building of the future, it must be acknowledged that the necessity for admitting the largest possible quantity of light into the interior of such buildings does not accord very well with the conditions of stability for masses of brick and mortar, and while some of the newer brick store fronts are models of skilful balancing of weights and resistances, others show violations of structural laws which must inevitably lead to their ruin before many years.

IN spite, however, of their frail piers, and their gigantic arches, held up only by the neighboring buildings, the most open brick fronts are far from presenting the almost unlimited window surface that can be obtained, at the same time with perfect rigidity and stability, by the use of iron. In the later iron buildings, whose architects had the courage to abandon the imitation of stone, and to use their material frankly as a metal of immense strength, the vertical and horizontal members are reduced in appearance almost to mere lines, the necessary substance being obtained by extension in planes perpendicular to the line of the street. The framework so composed, when bolted together at all the angles, is far more secure against the effect of every external force except fire than a light brick front, and if protected in some of the many ways now known to architects, it would surpass the brickwork even in that respect, without losing much, if any, of its own special advantages. It is a little surprising that this combination should not have come more generally into use for such purposes. The practice of fire-proofing interior columns and girders by coverings of terra-cotta, or wire-lath and plaster, has become very common, while exterior work is left bare; and the beautiful terra-cotta colonnade at South Kensington, built twenty years

ago, still remains the principal, if not the only, example of its class. That there will be before long a revival of iron building can hardly be doubted. In the business part of the great commercial cities of the present day light is too precious to be lost for the sake of architectural effect, and if protected iron can be made as secure against fire as brick, a matter about which there is no question among experts, some real-estate owner, who understands the relation between window surface and rental value, will attempt to use it, and if successful will set an example for others to follow. The course which the new development will take must depend very much upon the architects into whose hands the task of making the first essays may fall. If they are well-trained and enterprising the new problem will be full of interest, and its solution fruitful of future progress in art. If they are cold and dull, looking upon novel conditions as irksome, because thought and imagination are needed to deal with them, the step which they are called upon to make in American architecture will be one toward feebleness and failure.

THE last issue of the Report of the Massachusetts Board of Health, Lunacy and Charity for the Department of Health contains a paper on the Sewerage of Nahant, by Mr. Ernest Bowditch, the engineer in charge of the work. Nahant is a small, rocky peninsula, jutting into the sea from the northern part of the harbor of Boston, and is occupied in great part by rich proprietors for summer residence. Two years ago a very severe outbreak of typhoid fever occurred in the town, eighty cases being reported in a total population of fifteen hundred. The seriousness of the epidemic was hardly understood until the season had closed, but as soon as a comparison of the cases had shown the dangerous condition into which the place had fallen, a vigorous movement was made toward its amelioration. The peninsula has, or had at that time, no public water-supply, and no attempt at sewerage. Water for household use was obtained partly from wells, and partly from cisterns, and wastes were disposed of by means of cesspools or vaults. Naturally the first suspicion of infection fell upon the water-supply, and a great number of analyses were made of well and cistern water, which showed that objectionable contamination existed in more than half of them. The time remaining before the opening of the next summer season was too short to admit of securing a public water-supply, which would have to be brought from the mainland, a distance of eight or ten miles, or sought for in the underlying strata of the peninsula by means of artesian wells; but it was possible to remove the sources of contamination which already existed by means of a system of sewers, and the resolution was promptly taken to introduce these at once. Thanks to Mr. Bowditch's energy, the execution of the work corresponded in vigor with the disposition of the town government, and more than five miles of sewers, with man-holes and flush-tanks complete, were constructed in five months, together with nearly all the private drains, cesspools, grease-traps and fresh-air inlets connected with the sewerage system; while in addition to this work, the foul vaults of the poorer dwellings were cleaned out and filled up, and either movable pails, standing on asphalted floors, or tight, shallow vaults of brick and cement, were substituted; and at the same time certain marshy spots, which received foul water from the neighboring houses, were thoroughly drained.

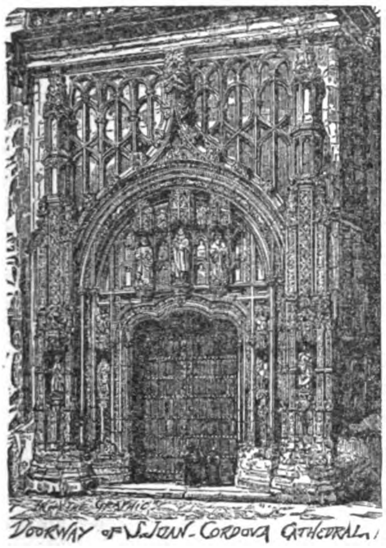
THE good effect of these measures was seen immediately, and although no change had been made in the wells and cisterns, except to clean them out, not a single case of typhoid fever occurred in the town during the season of 1882 which was not proved to have had a foreign origin. It is true that the summer population was less by some three hundred than that of the preceding year, and also that many of the richer inhabitants, warned by their previous experience, used spring water, brought to them from a distance, for drinking and cooking, but even allowing for these circumstances, the complete recovery of the town from a serious epidemic is remarkable. As an incident of the benefit conferred by the sewers, the immediate improvement of the well and cistern water, which, deriving its original contamination from a slowly saturated soil, might be expected to show the effect almost undiminished for years after the sources of contamination had been removed, is interesting. Actual analyses were made in 1882 of water from many of the wells and cisterns which proved to have been most seriously corrupted, the result showing in many instances a striking change. In most tests, the analyst knew nothing of the source from which the samples came, so that the comparison is quite impartial. In one case, the water, taken in November, 1881, from the cistern of a house in which a very severe case of typhoid fever had occurred, was pronounced "highly dangerous." In 1882 another sample was taken from the same cistern, which showed on analysis a large amount of free ammonia, perhaps due, as the chemist thought, to ammoniacal vapors from the chimneys, but less than one-sixth as much albuminoid ammonia as the earlier sample, and less than one-third as much chlorine, and in general about one-fourth as much residue of all descriptions, and was pronounced to be "a satisfactory water," "from a sound and clean cistern." Of the well-waters, one sample, taken in 1881, from a well not more than twenty feet deep, in running gravel, was pronounced "unfit for use." In February, 1882, just at the time of the commencement of the sewerage work, water from the same well was pronounced "very soft and good," and in July of the same year, it was called "still an excellent water."

LA SEMAINE DES CONSTRUCTEURS reports some very encouraging news from the scene of operations on the Panama Canal, where fourteen thousand men are now hard at work excavating on the line of the great trench. The terrors of the climate have been, with the help of the dry and comfortable sectional houses brought from the United States, in great part overcome, and the well-kept gardens which now surround each house have provided the tenants with European vegetables, to their great benefit and satisfaction. A large majority of the laborers now employed are negroes from Jamaica and the Antilles, who are seasoned to a tropical climate, and have little to fear from the fever; and the laziness which was supposed to be habitual to the race has disappeared with surprising rapidity under the stimulus of payment "by the piece," instead of by the day. A certain sum is paid for each carload of material excavated, and the men, who can in this way easily earn five or six francs a day, exert themselves to the utmost to increase the amount of their gains. For such of the work as can be done by mechanical appliances, the French and Belgian excavating machines have, after a fair trial, proved themselves the best, and have therefore replaced the American excavators; but it is gratifying to learn that another Yankee invention, that of the diamond drill, has shown itself far superior to all its foreign rivals, and will be of much service in rock excavation. The most important of the operations in rock on the line of the canal is the vast cutting of the Culebra, three hundred and ninety feet in depth, the material from which is to be utilized in the construction of the dam across the Chagres River, not far away.

THE scheme of the Pittsburgh glass-blowers for establishing a coöperative manufactory of their own excites a good deal of attention, and many comments, favorable and unfavorable, are made upon it by the daily papers. Among the best of these should be mentioned an editorial in the *Iron Age*, which, with its associated periodicals, may generally be relied upon for sensible and sympathizing interest in everything affecting the welfare of working men. Instead of drawing an imaginary picture of future prosperity for the new enterprise, the editor of the *Iron Age* reminds his readers that such ventures are rarely successful, the men who take part in them possessing neither the persistent courage necessary to sustain them through the discouragements inseparable from the commencement of any business, nor the habits of untiring industry, so little encouraged by the present eight or ten hour system, which can alone lay the foundation for future success; and warns the glass-blowers that "those who are not prepared to make greater sacrifices as proprietors than they were ever willing to make as workmen had better not go into the undertaking." It would be impossible to wish better to the glass-workers who are disposed to try their fortune in the new venture than that they should take this excellent advice to heart; and if they will do so they may be assured that whatever the result may be, their experiment will be productive of nothing but good to them. They may not be able to persist until they reach final prosperity, but if they work diligently and courageously as long as their means will permit, they will find that the effort alone, in developing their intelligence, forethought and self-reliance, has perhaps done more for their future, and for that of their families, than could even a more obvious success in their undertaking.

SPANISH ARCHITECTURE.[1] — III.

CORDOVA (*continued*).



CORDOVA was so essentially a city of the Moors, and so superb a city withal in the victorious times of those brilliant warriors, that even to this day the things which are not, at least in some degree, of Moorish origin seem to an enthusiastic visitor to be intrusions. Even the few beautiful examples of architecture in other styles, notwithstanding their richness, have a somewhat discordant effect, like that of a new full-toned string among the quaint twanging wires of an old harpsichord.

The Plateresque style was very often used with such effect as this. It is the last flickering of the Gothic spirit with increasing adulteration and deterioration (from the Gothic stand-point) by the admixture of newly-imported Renaissance features. When it allows sufficient dominance of either of these motives, so as to contain some elements of unity, it is often very interesting, as for instance, in the doorway of S. Jean Cordova Cathedral. Here, although debased and often meaningless, the ornament is still of Gothic derivation, with scarcely a trace of the Italian influence. It may be taken as a specimen of the architecture upon which the new ideas were soon to be engrafted. In examples of a little later date we find the buttresses becoming disguised as pilasters, and little broken pediments supplanting the crocketed gablets until, in the last Plateresque work, the Gothic element is almost eliminated, and the Renaissance asserts itself; and it must be remembered that the latter had already in Italy and elsewhere progressed through stages of development into those of decline, so that it is not here always distinguishable as "early" or "late" by simplicity or complexity. During this Plateresque period much work was done in adding doorways and façades to the ancient buildings, often, as I have remarked, with little regard to unity of effect; and still more inharmonious are those extravagant abortions in stone and plaster which the later Renaissance here, as elsewhere, reared in that age of financial wealth and æsthetic poverty; and some of these are placed (as was the *coro* of the Cathedral) in such contact with older and truer work that it is evident that the builders thought they were beautifying instead of defacing the architecture which had become old-fashioned. Perhaps it is more excusable in the case of patriots regaining their fatherland from the hated conquerors of another race and religion — it is not surprising that the Christian Spaniard thought he did well in raising *rococo* doorways, and screens, and chapels to change the aspect of the Oriental mosques — yet there seems to have been always some misguided notion of improvement in ignorant humanity all the world over in their treatment of architectural inheritances, down to the times when our Philistine forefathers in England whitewashed the cathedrals; a notion that the work they did made its subject better in some way or other than it was before. Fortunate are the people who, in improving their old-fashioned architecture, have not disfigured it. Many have done so without the excuse which the Spaniards had, — that at least they produced something to record their recovery of possession of the soil and its treasures; something to partly change the aspect of works which were a record of their subjection. Most of the architects who designed the Renaissance additions to Moorish buildings in Cordova and other Spanish cities did this truly, for these works, whether compiled of the dead blank masses of masonry, called by Ford "Græco-Roman," or of the wild medleys of the Churrigueresque have a character different enough from the Moorish to have been highly gratifying to their creators.

There is much of this description inside the Cathedral in chapels, and altars, and retables, and screens; and hard by is a bishop's palace of kindred taste; while nearly every church in the city contains little or much of such wretched design executed in tawdry materials,—theatrical structures of boards, and paint and gilding; bad enough on the stage but pitiable in a church. It cannot be denied that the Renaissance in Spain produced a great deal of beautiful work, and when it stands for itself, not applied to older and different structures, one can often sympathize with its exuberance, and pardon some excesses in that respect, but these examples are to be sought in other localities.

Cordova does not possess much of Renaissance styles that is good. After the conquest of the Moors its wealth and influence, which had already waned from their magnificent proportions of the ninth century, declined rapidly, and the city was never in its Spanish history what it had been under the Moors. One can find, here and there, a Spanish-Italian work of good design in the simpler and earlier manner, but only a very few pleasing specimens of the more elaborate styles. Among the former the tower of the church of San Lorenzo is rather curious. The lower part rises square and plain at the north-west angle of the church, and supports a massive belfry of simple arches and pilasters, with two openings on each side. Upon the pier between these openings comes the weight of the arched upper belfry, which is also square, but set diagonally upon the substructure. As I have already noted of the Giralda at Seville, a square belfry, placed parallel upon its basement retains much of the character of composition of the Moorish towers, but it is interesting to notice how completely the expression is changed by turning the crowning feature this one-eighth of a circle. The grouping and proportions might, perhaps, be better than in this example, but the constructive principles are sound, and it is possibly a suggestion for a better effort in the same direction. The position of the bells low down in the tall arches is very pleasing. [*See Illustrations.*]

Another phase of the revolution in Spain's architectural history, consequent upon the overthrow of the Moors, produced much beauty in works of a style called the Mudejar, of which some examples are to be found in Cordova, although finer and more complete specimens may be seen in Seville and Toledo. It is a kind of fusion of the styles of the two races, more or less complete in different places, and varying, too, in the preponderance of influence of one or other of the two. It belongs to that period when the Spanish re-possession of a city was so new that the influence was only partial, and what there was yet worked in Gothic forms (except as they were modified by Moorish ideas) free from the Italian fashion. Sometimes we see works almost purely Moorish, yet evidently built for Christian purposes, and under Spanish direction. In some other buildings whose style is European in conception, and in almost all the detail, parts will be found which have much of the Eastern character, or even which were clearly designed and executed by men of the alien race; and between these two extremes the Mudejar style proper shows in some instances a complete amalgamation of the motives and spirit of the Gothic and Moorish which had preceded it separately, and, although it is perhaps rare that the balance is so even, it does occasionally produce most beautiful and suggestive results. It is not Gothic in one bit and Moorish in another; not a combination of one with the other piecemeal, but it partakes of the nature of both, while it is in itself characteristic and different from either. Some of this work I thought exceedingly good, and it seems to me that there is in it a good suggestion of how modern architects may better profit by the past than by borrowing directly from it. There is a hint that in seeking to improve our work by study of the ancients it is the essence, the spirit, the expression of a good thing noted in the sketch-book that should be valued, rather than the actual forms and dimensions. The ideas and principles are susceptible of very much wider adaptation than the stones which express them, and if designers will work as did the best of the Moresco-Spanish artists, not imitating, but making the things they wanted with the method of beauty discovered in foreign things, they will more rarely encounter the charge of plagiarism which so much modern work meets with and deserves, when the very lines and compositions of some original work are copied into situations for which they are unfit or inharmonious.

The Mudejar style is of much archæological interest too, in that it shows that less of the race hatred existed than one would expect. It is clear that the Moorish population was not ejected completely from the land along with its kings and armies. The conquerors, men of war, employed the subjugated Moorish artisans in the arts of peace when peace was established, and even for some time tolerated their religion and customs; and not a few only, but in some cities nearly all of the industries were in their hands. Populations migrated slowly in those days, and it was a very gradual change that transformed a Moorish city into a Spanish one, in fact as well as name; so gradual that it was never really completed to the extermination of everything Moorish. Not only the architecture, but the language and habits of the people still retain many evidences of these facts, which will last as long as the stock upon which they are engrafted.

I am sorry that I had not time for a longer study of Mudejar work. I saw much that deserved careful description with pencil and pen. One drawing made at Cordova is given with this — of the west window of the church of San Lorenzo. I think the blending is almost as complete in this as in any example. The window has lost none of the fitness or beauty of a Gothic rose window, while it has taken on a great amount of the grace and delicacy of the Moorish traceries and arches. From one origin come the ideas of the radiating columns, the concentric circles, the cusping of small piercings, and the subdivision of the main arch into moulded and recessed rings; from the other the interlacing character of the tracery, the varying forms of the piercings, and the mode of accentuating the design by lines on the face of the stone. Of course, a purist may assert that the Gothic pure and simple is equally beautiful, and the churchman that it would have been better if undefiled by the Moslem art. That may be true in its way, and yet the style be no more beautiful than either of its parents, since it carries the expression which its makers desired, and which was so natural in them, and, moreover, can at least claim not to have actually lost by its departure from precedent either in utility or beauty. It seems to me to be worthy of some appreciation, for

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[1] By Robert W. Gibson, Travelling Student of the Royal Academy. Continued from page 196, No. 409.

similar circumstances have at other times and places produced, and are now producing, far inferior results.

TRANSVERSE STRENGTH OF TIMBER.[1]—I.

If we consider the amount of literature upon the strength and stiffness of timber beams under a transverse load, it might seem almost superfluous to write upon the subject; but while article after article has been written, transforming and retransforming the formulæ into this or that shape, according as one form or another has seemed most convenient to the writer, nevertheless the experiments which have served to determine the constants for use in these formulæ have been derived from tests made on specimens much smaller than those used in practice. We are thus brought face to face with the question whether it is correct to employ these same constants in determining the proper dimensions of full-size beams, such as are used in practice, in which we have knots, crooked grain, cracks, and general lack of homogeneity.

It was with a view to investigate this question, and also with the view of giving the students practice in actual testing, that a testing-machine of fifty thousand pounds' capacity was arranged to test the transverse strength and stiffness of beams twenty-five feet long. This machine is in operation in the laboratory of Applied Mechanics of the Massachusetts Institute of Technology, Boston, and is used for the instruction of the students.

Up to the present time, sixty-five tests have been made on transverse strength and stiffness, and the results have fully justified the experiments, as the breaking strength of full-size beams as found by experiment are very much less than the breaking strengths as calculated by means of the constants in common use. The deflections under given loads have also been found to be somewhat greater than those ordinarily calculated, and considerably greater, if the action of time be taken into account.

COMMON THEORY OF BEAMS.

In giving an account of these results, and deducing from them the consequences that follow, it will be necessary, in order to make the paper intelligible to all, to develop here the principles that underlie the common theory of beams, so far as to enable the reader to deduce the formulæ necessary to use. I will also give the deduction of some of the formulæ.

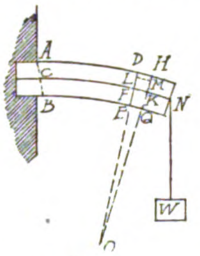


Fig. 1.

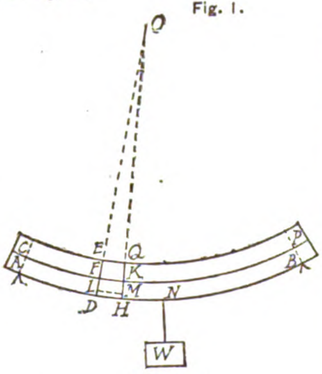


Fig. 2.

The first figure shows a beam fixed at one end and loaded at the other; the second figure, one supported at the ends and loaded at the middle. Let, in each case, the plane of the paper contain any vertical, longitudinal section of the beam. In the first figure it is evident that the upper fibres are lengthened, while the lower ones are compressed; and *vice versa* in the second. In either case there is, somewhere between the two outside fibres, a fibre which is neither elongated nor compressed. Let $C N$ represent that fibre in the first figure, and $C P$ in the second.

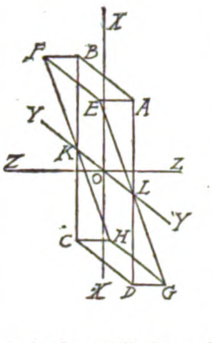
This line may be called the neutral line of the longitudinal section, and if a cross-section be made at right angles to this line, then the horizontal line which lies in the plane of the section, and has one point in common with this line is called the *neutral axis* of the cross-section. In the ordinary theory of stresses in beams, a number of assumptions are made, which I will proceed to enumerate:—

ASSUMPTIONS MADE IN THE COMMON THEORY OF BEAMS.

Assumption No. 1. If, when a beam is not loaded, a plane cross-section be made, this cross-section will still be a plane after the load is put on and the bending takes place. From this assumption we deduce, as a consequence, that if a certain cross-section be assumed, the elongation or compression per unit of length of any fibre, at the point where it cuts this cross-section, is proportional to the distance of the fibre from the neutral axis of the cross-section.

Proof.—Let $E\ D$ and $Q\ H$ be the lines in which these cross-sections cut the plane of the paper, and let O be the point of intersection of the lines $E\ D$ and $Q\ H$. Then let $O F = r$, $F L = y$, $F K = l$, $L M = l + a\,l$, where a is the elongation per unit of length of the fibre whose distance from the neutral axis is y, y being a variable; then, because $F K$ and $L M$ are concentric arcs subtending the same angle at the centre, we shall have the proportion $\frac{OF + FL}{OF} = \frac{LM}{FK}$ or $\frac{r+y}{r} = \frac{l+al}{l}$ or dividing out we have $1 + \frac{y}{r} = 1 + a$, or $a = \frac{y}{r}$, or $a = (\frac{1}{r})\,y$; but as y varies for different points in any given cross-section, while r remains the same for the same section, it follows that a varies as y, and hence follows the proposition.

Assumption No. 2. This assumption is that commonly known as Hooke's law. It is as follows: The stress is proportional to the strain, *i. e.*, to the elongation or compression per unit of length. As to the evidence in favor of this law, experiment shows that as long as the material is not strained beyond safe limits, this law holds. Hence, if these two assumptions be correct, we shall have:—



At a given cross-section of a loaded beam, the direct stress on any fibre varies directly as the distance of the fibre from the neutral axis. Hence it is a uniformly varying stress, and we may represent it graphically as follows:—

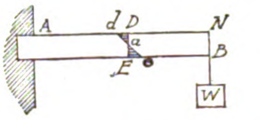
Let $ABCD$ be the cross-section of a beam, and KL the neutral axis. Assume this for axis $O\ Y$, and draw the other two axes as in the figure. If now, $E\ A$ be drawn to represent the intensity of the direct normal stress at A, then will the pair of wedges $AEFBKL$ and $DCHGKL$ represent the stress graphically, since it is uniformly varying.

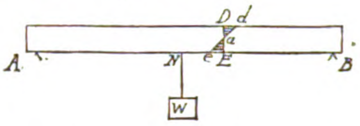
POSITION OF THE NEUTRAL AXIS.

Assumption No. 3. This assumption is that the only resistances opposed to the bending of the beam are the direct tensions and compressions of the fibres.

Making use of these three assumptions, we can show that the neutral axis must pass through the centre of gravity of the cross-section.

To show how this is done, we have the following: Since the curvatures in the preceding figures are exaggerated, in order to render them visible, I have drawn the next two figures:—





If now, we assume a section DE such that $AD = x$ in the first figure, and $NE = x$ in the second figure, and consider the forces that act on that part of the beam which lies to the right of $D\ E$,—*i. e.*, both the external forces and the stresses exerted by the other part of the beam upon this part, we must find them balancing each other. The external forces are, in the second figure:—

1°. The loads acting between B and E, and in this case there are none.

2°. The supporting force at B, and in this case it is equal to $\frac{W}{2}$.

In the first figure they are:—

The loads between D and N, and in this case there is only one; viz., W.

The internal forces are merely the stresses exerted by the other parts of the beam on this part, and they are:—

1°. The resistance to shearing at the section, which is a vertical stress.

2°. The direct tensions and compressions of the fibres, which are horizontal.

Hence, since the forces enumerated must balance each other, and since all are either vertical or horizontal, it follows:—

1°. That the vertical forces must balance each other.

2°. That the horizontal forces must balance each other.

3°. That the tendency of the external forces to cause a rotation of the part of the beam under consideration must be balanced by the tendency of the internal stresses to prevent that rotation.

But the second condition shows us that, inasmuch as the only horizontal forces are the direct tensions and compressions, therefore the total tension must be just equal and opposite to the total compression. Hence, wedge $a\,D\,d$ = wedge $a\ E\ e$. And if these two wedges are to be equal, it can easily be shown by the use of the calculus that the neutral axis $K\ L$ must contain the centre of gravity of the section, whatever be the form of the section; and, if the section be rectangular, it is evident, even without the calculus, that the neutral axis must pass through the centre of the section, for only thus can the wedges be equal.

RÉSUMÉ.

The conclusions arrived at from the foregoing are as follows:—

1°. That at any section of a loaded beam, if a horizontal line be drawn through the centre of gravity of the section, then the fibres lying along this line will be subjected neither to tension nor to com-

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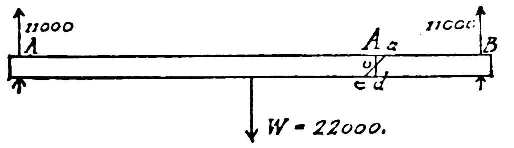
[1] By Gaetano Lanza, Professor of Applied Mechanics, Massachusetts Institute of Technology.

pression; in other words, this line will be the neutral axis of the section.

2°. The fibres on one side of this line will be subjected to tension, those on the other side being subjected to compression; the tension or compression of any one fibre being proportional to its distance from the neutral axis.

These are the fundamental principles of the common theory of the stresses in beams, and I will now proceed to show how to deduce upon this, as a basis, some of the common formulæ for the strength of rectangular beams.

In order to make matters clearer, I will, before deducing formulæ, work out a numerical example. Let us suppose a beam 24 feet long, supported at the ends and loaded at the middle with 22000 lbs. Let the section of the beam be 9 inches wide by 14 inches deep, and let it be required to find the stress at different points. Suppose we set out first to find the stress at the outer fibre, at a point 6 feet from the middle.



Solution. — The total tendency of the external forces to bend the part of the beam to the right of A, about A, is the supporting force multiplied by its leverage, or $11000 \times 6 = 66000$ foot-pounds $= 12\ (66000) = 792000$ inch-pounds, and this is called the bending moment at the section at A; moreover, this tendency must be resisted by the stresses represented by the wedges $A\ a\ o - o\ d\ e$. Now, if we let p represent the intensity of the stress at A, then, since area $o\,A = (9 \times \frac{14}{2}) = 63$ square inches, and since $\frac{p}{2}$ represents the mean stress on this area, and therefore $(63)\ (\frac{p}{2}) = \frac{63p}{2} =$ force represented by wedge $A\ o\ a$. The force represented by the lower wedge is the same. The resultant of each acts at the centre of gravity of its corresponding wedge, a distance of $\frac{2}{3}\ (o\,A)$ from o. This gives two equal and opposite forces, each equal to $(\frac{36p}{2})$ at a distance apart equal to $2\ (\frac{2}{3}\ o\,A) = \frac{4}{3}\ o\,A = \frac{2}{3}\ (14) = \frac{28}{3}$ inches. This gives for the moment of these two forces $(\frac{63p}{2})\ \frac{28}{3} = 294p$.

Since this is the moment that resists the bending moment, we must have: — $294\ p = 792000\ \therefore\ p = \frac{792000}{294} = 2964$ pounds per square inch. If, on the other hand, we require the stress per square inch at the outside fibre at the middle of the beam, we should have for bending moment: —

$11000 \times 12 = 132000$ foot-pounds $= 1584000$ inch-pounds $\therefore\ 294\ p = 1584000\ \therefore\ p = \frac{1584000}{294} = 5388$ pounds per square inch.

If we now substitute letters for the figures in the example, and pass also to the general case, we shall have 1°. If the breadth $= b$ and the depth $= h$, then if we represent the stress at the outside fibre by p, we shall have for the stress represented by the upper wedge $(\frac{p}{2})\ (\frac{bh}{2}) = \frac{pbh}{4}$, and the leverage about o will be $\frac{2}{3}\ (\frac{1}{2}\ h) = \frac{h}{3}\ \therefore$ the leverage of the couple will be $\frac{2h}{3}$. Hence the total moment that resists the bending moment will be $(\frac{pbh}{4})\ (\frac{2h}{3}) = \frac{pbh^2}{6}$.

Now, in all cases of rectangular beams, if M represents the bending moment at any section, or the tendency to turn the part of the beam that lies to one side of the section about a horizontal axis in the section, we must have $M = p\,\frac{bh^2}{6}$ (1).

Hence, if we wish to find the stress at the outer fibre of any section, we must find the bending moment at that section, and then determine the stress at the outer fibre from equation (1).

If, on the other hand, we wish to determine the stress to which the most strained fibre of the beam is subjected, we must first find the greatest bending moment, and then the equation (1) will give us the greatest value of p.

Again, if we wish to find the greatest load that a beam can bear without causing a stress in the outer fibre greater than f, we must determine the greatest bending moment in terms of W, the load, and then put $M = f\,\frac{bh^2}{6}$.

Definition. — The moment of a force about an axis perpendicular to the force is the product of the force by the perpendicular distance between the axis and force.

Definition. — The bending moment at any section of a loaded beam is the total tendency of the external forces to turn that part of the beam that lies to one side of the section about the section; or, in other words, it is the resultant moment of the external forces acting on that part of the beam that lies to one side of the section, these moments being taken about a horizontal axis in the section.

In a beam supported at both ends it is the difference between the moment of either supporting force and the sum of the moments of the loads between the section and that support, all the moments being taken about a horizontal axis in the section.

FORMULÆ FOR BENDING MOMENT.

I will now give a table of bending moments for some of the more common cases of loading of beams. Let, in each case, the length of the beam be l, and the total load W. When the beam is fixed at one end and free at the other, let the origin be taken at the fixed end; when it is supported at both ends, let it be taken directly over one support. Let x be the distance of any section from the origin; then we shall have the following results: —

Description of Beam.	Distribution of Load.		Bending Moment.	
			At distance x from the origin.	Greatest.
Beam fixed at one end and free at the other.	Single load at free end.		$W(l-x)$.	Wl
	Load uniformly distributed.		$\frac{W}{2l}(l-x)^2$	$\frac{Wl}{2}$
Beam supported at both ends.	Single load at middle.	Between origin and middle.	$\frac{W}{2}x$	$\frac{Wl}{4}$
		Beyond middle.	$\frac{W}{2}(l-x)$	
	Load uniformly distributed.		$\frac{W}{2l}(lx-x^2)$	$\frac{Wl}{8}$
	Single load at a distance a from origin.	Between origin and load.	$\frac{W(l-a)}{l}x$	$\frac{Wa}{l}(l-a)$
		Beyond load.	$\frac{Wa}{l}(l-x)$	

MODULUS OF RUPTURE.

If a beam be broken, and if, from its breaking load W, the value of f be calculated from equation (1), then is f called the *modulus of rupture* of the material. It would (if all the assumptions made in the common theory of beams, and hence in the deduction of equation (1) held up to breaking) represent the tensile or compressive stress per square inch at the most strained fibres at the time of breaking.

FORMULÆ FOR BREAKING LOAD AND MODULUS OF RUPTURE IN RECTANGULAR BEAMS.

I will next give the formulæ for breaking load in terms of the modulus of rupture, and for modulus of rupture in terms of the breaking load, for some of the most usually occurring cases of rectangular beams.

Let $W =$ Breaking load in pounds.
$f =$ Modulus of rupture in pounds per square inch.
$b =$ Breadth of beam in inches.
$h =$ Depth of beam in inches.
$l =$ Length of beam in inches.

Then we shall have: —

(A) *Beam fixed at one end and free at the other.*

1°. Single load at free end, $W = f\,\frac{bh^2}{6l}$; $f = \frac{6Wl}{bh^2}$.

2°. Load uniformly distributed, $W = f\,\frac{bh^2}{3l}$; $f = \frac{3Wl}{bh^2}$.

(B) *Beam supported at both ends.*

1°. Single load at the middle, $W = \frac{2}{3}\,f\,\frac{bh^2}{l}$; $f = \frac{3}{2}\,\frac{Wl}{bh^2}$.

2°. Load uniformly distributed, $W = \frac{4}{3}\,f\,\frac{bh^2}{l}$; $f = \frac{3}{4}\,\frac{Wl}{bh^2}$.

3°. Single load at a distance a from the origin, $W = f\,\frac{lbh^2}{6\,a\,(l-a)}$; $f = \frac{6\,Wa\,(l-a)}{bh^2}$.

When we know the value of the modulus of rupture for any given material, we can compute the breaking load of any rectangular beam of given dimensions, by means of the principles already enunciated, or else by means of the formulæ just developed, if they fall under any of the cases just enumerated.

We have then been told that when the safe load is to be determined by dividing the breaking load by a certain number called the *factor of safety*, that while in iron bridge-work 4 is a suitable factor of safety, that for wood we must use a factor of 6, 8, or 10; indeed, ideas seem rather indefinite as to what this factor should be. The cause of this will, I think, be evident, when we consider that the usual method of proceeding is to determine the modulus of rupture from tests made on very small pieces, and from this modulus to compute the breaking weight of full-size beams.

FORMULÆ FOR THE BREAKING LOAD OF TIMBER BEAMS, THE CONSTANT BEING IN THE FORM USED BY TRAUTWINE AND HATFIELD.

I will give later a comparison of the moduli of rupture as determined from these tests, with those usually given; but will first say that the constant for calculating the breaking strength of rectangular beams is given by different authors in different forms. A form very commonly used is the so-called centre breaking load of a beam one inch square, and one foot long, supported at the ends. This is the constant in the form given by Trautwine, by Hatfield, and by others. To compare it with the modulus of rupture, we only need make $b = h = 1''$, and $l = 12''$ in the formula $W = \frac{2}{3}\,f\,\frac{bh^2}{l}$ and we shall have: $W = \frac{2}{3}\,\frac{f}{6}$, or $W = \frac{f}{18}$

Hence the value of this constant will be one-eighteenth of the modulus of rupture; if we call its value c, we shall have, $c = \frac{f}{18}$.

Hence calling L the length in feet, the formulæ already given would, if c be used as the constant, become: —

(*A*) *Beam fixed at one end and free at the other.*

1°. Single load at free end, $W = \frac{3cbh^2}{l} = \frac{cbh^2}{4L}$.

2°. Load uniformly distributed, $W = \frac{6cbh^2}{l} = \frac{cbh^2}{2L}$.

(*B*) *Beam supported at both ends.*

1°. Single load at middle, $W = \frac{12cbh^2}{l} = \frac{cbh^2}{L}$.

2°. Load uniformly distributed, $W = \frac{24cbh^2}{l} = \frac{2cbh^2}{L}$.

3°. Single load at a distance a from the origin, $W = \frac{3clbh^2}{6a(l-a)}$.

DEFLECTION OF BEAMS.

While the preceding formulæ refer to the breaking strength of beams, it is better engineering to determine as the safe load of a beam, the load that will not deflect it more than a certain small fraction ($\frac{1}{300}$ or $\frac{1}{400}$) of the span. I shall not enter into the deduction of the deflection formulæ, but will merely write them out, stating first, that these formulæ are based upon the same assumptions as the other formulæ, and the additional assumption that the angle of slope is very small.

Let $W =$ Given load in pounds.
$b =$ Breadth in inches.
$h =$ Depth in inches.
$l =$ Length in inches.
$v =$ Greatest deflection in inches.
$E =$ Modulus of elasticity of the material in pounds per square inch.

(*A*) *Beam fixed at one end and free at the other.*

2°. Load uniformly distributed, $v = \frac{5}{32} \frac{Wl^3}{Ebh^3}$; $E = \frac{5}{32} \frac{Wl^3}{vbh^3}$.

1°. Single load at free end, $v = \frac{4Wl^3}{Ebh^3}$; $E = \frac{4Wl^3}{vbh^3}$.

2°. Load uniformly distributed, $v = \frac{3}{2} \frac{Wl^3}{Ebh^3}$; $E = \frac{3}{2} \frac{Wl^3}{vbh^3}$.

(*B*)

1°. Single load at the middle, $v = \frac{1}{4} \frac{Wl^3}{Ebh^3}$; $E = \frac{1}{4} \frac{Wl^3}{vbh^3}$.

The above formulæ enable us to determine the deflection of a beam under a given load, when the modulus of elasticity of the material is known, or to determine the modulus of elasticity of the material from the observed deflection.

SHEARING FORCE IN BEAMS.

The *shearing force* (technically so called) at any section of a loaded beam is the tendency of the part on one side of the section to slide by the part on the other side. In a beam fixed at one end and free at the other, it is the sum of the loads between the section and the free end. In a beam supported at both ends, it is the difference between either supporting force and the sum of the loads between the section and that support.

LONGITUDINAL SHEARING OF BEAMS.

Besides, and consequent upon this tendency to shear along a vertical plane, there is, in the case of a beam under a transverse load, a tendency to a longitudinal shearing along the horizontal layers, the intensity becoming greatest at the neutral layer. I shall not enter into a discussion of the formulæ for the intensity of this shearing force, but shall merely give the formulæ for its greatest intensity in the case of rectangular beams.

In any rectangular beam, the greatest intensity of the longitudinal shearing force at any section, *i. e.*, its intensity at the neutral axis of the section is, if we let $F =$ shearing force at the section technically so-called, in pounds: —

$b =$ Breadth of beam in inches.
$h =$ Depth of beam in inches.

$$\frac{2}{3} \frac{F}{bh}.$$

In the case of a beam supported at the ends, and loaded at the middle with a single load, we have, for all sections except the middle, $F = \frac{W}{2}$ and hence, if we denote by i the greatest intensity of the longitudinal shearing force at the neutral layer, we shall have $i = \frac{3}{4} \frac{W}{bh}$ (1), and this is the intensity of the shearing force at all points along the neutral layer, except at the middle section, where it is zero.

In the case of a beam supported at the ends, with the load uniformly distributed, the greatest intensity is that at the support, and is also given by equation (1), but decreases gradually to the middle.

Having given this much in the way of theory and formulæ, I will next give a summary of the results of the tests, and then follow with the tables of results of the individual tests.

THE ILLUSTRATIONS.

COMPETITIVE DESIGN FOR A MONUMENT TO THE CONFEDERATE DEAD, NASHVILLE, TENN. MR. HENRY O. AVERY, ARCHITECT, NEW YORK, N. Y.

IN the absence of any recognized emblems of an established government, the late Confederacy of Southern States is here simply recalled by an attic of discs (five in front, five in the rear) on which are placed the names of the ten individual States in the order of their oath of allegiance. The State of Tennessee is personated by a bronze emblematic figure, which clasps to its breast a group of swords representing the principal grades of officers of the Southern army. Total height, forty feet; material, light Indiana limestone.

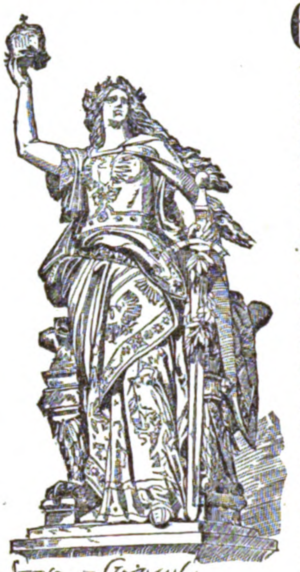
ST. LORENZO, CORDOVA, SPAIN; TOWER AND ROSE WINDOW. DRAWN BY MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

FOR a description see the article on "Spanish Architecture" elsewhere in this issue.

HOUSES OF D. W. GIBBS, ESQ., AND D. L. STINE, ESQ., TOLEDO, O. MESSRS. D. W. GIBBS & CO, ARCHITECTS, TOLEDO, O.

THE ALBANY CHAMBERS, MONTREAL, CANADA. MR. THOMAS C. SORBY, ARCHITECT, MONTREAL, CANADA.

THE GERMAN NATIONAL MONUMENT.


STATUE OF GERMANIA.
MONUMENT AT NIEDERWALD GERMANY

ON September 28, the National Monument on the Niederwald, overlooking the Rhine, was unveiled by the Emperor of Germany. The idea of such a monument was, says a correspondent of the *Times*, mooted to Prince Bismarck by Count Eulenburg so early as the day of the signature of the Peace of Frankfort. Warmly approved by the Chancellor, the project soon after passed into the hands of an executive committee, which converted it into a resolution that received support throughout the nation. In the spring of 1872 the artists of all Germany were invited to send in models of a monument that would best express the idea and object of its erection; but though three of the twenty-six competitors were awarded prizes of honor, the jury declined to adopt any of their sketches. A second competition had no better result; but at last, in April, 1874, the jury expressed themselves thoroughly satisfied with the architectural and sculptural plan of Professor Johannes Schilling, of Dresden, who was thereupon authorized by the grand committee, under the presidency of Herr Benningsen, chief of the National Liberals, to proceed with its execution.

The cost of the monument, which is not expected to exceed the estimated sum of 1,100,000 marks, or £55,000, has been covered partly by public subscription, and partly by Parliamentary aid. As much as 240,000 marks had been collected by 1874, but there was a falling off in the contributions in the reactionary era ensuing on the *Gründerzeit*, or time of rash and not over-honest commercial speculation prompted by the receipt of the French milliards; and though by 1878 the above sum had increased to 665,000 marks by the accumulation of interest, the sale of photographs, and the collection lists of schools and veteran societies (*Krieger-Vereine*), the Reichstag in the following year saw itself compelled to vote a subsidy of 400,000 marks in order to insure the completion of the enterprise. In 1876 the necessary ground was purchased; in September of the following year the foundation stone was laid; and now the finished monument stands flashing high and far "on free hill-top by German stream" in all its proud and noble beauty.

The tourist as he passes up or down the river cannot but be struck with the shining monument away up on the Niederwald brow, but it is only when he has toiled up to it that he can take in all its expressive character and truly beautiful proportions. A colossal statue of *Germania*, said to be an idealized copy of the artist's own daughter, clad in a flowing girdle-bound robe, her left hand resting on the hilt of a drawn but laurel-sheathed sword, and her right holding high a laurel-wreathed Imperial crown — that is what surmounts the huge statuary edifice and first fetters the eye. Beneath her mantle, which is richly embossed with historic symbolism, can be seen a coat of chain mail, over that being a steel breast-plate blazoned with the spread eagle, and she is standing before an Imperial or curule throne, or chair. Underneath, on the pedestal is the inscription, "In memory of the unanimous and victorious rising of the German people and of the restoration of the German Empire, 1870–71." On the one side of the pedestal are the names "Weissenburg, Wörth, Spicheren, Courcelles, Mars-la-Tour, Gravelotte, Beaumont, Sedan;" and on the other, "Strassburg, Metz, Le Bourget, Amiens, Orleans, Le Mans, St. Quentin, Paris." A succession of well-laid-out terraces and flights of steps leads up to the foot of the monument, the front basement of which presents two very large and finely-sculptured recumbent figures — the Rhine and the Moselle — the former in the shape of a Father Neptune-looking old man offering a cornucopia to his companion, a lovely nymph with an oar or rudder in her hand. Above that on the first socle is a magnificent relief group representing "Die Wacht am Rhein," flanked at the corners by two outstanding figures, *War* and *Peace*, each about 6 metres high — the former, an allegorical character, partly Mercury, partly mediæval knight, with blastful trump in one hand, and sword in the other; the latter, a mild and modest angel maiden, holding out an olive branch in one hand and the full horn

of peaceful blessings in the other. Between the two is the front façade, representing the "Watch on the Rhine" — a faithfully and splendidly-executed relief group. In the centre is the Emperor William on horseback against a background of the banners of the chief German cities, flanked on either side by the chief princes and generals, corps and divisional commanders, and statesmen — nearly two hundred in number — who helped by word, or deed, or counsel to found the Empire. The Kings of Saxony and Bavaria, the Crown Prince, Prince Frederick Charles, Bismarck, Moltke, Roon, and all the rest of the kaisers, princes, knights, and paladins are there — true to the life in breathing bronze; a rich storehouse and infallible standard in every respect; an Elgin-marble slab, so to speak, of the German nation. In the corner of the façade relief next the figure of *War* is a group of combatant German soldiers, while on the other side near *Peace*, warriors are shown in their career of victory. Beneath the group are inscribed five verses of the "Wacht am Rhein" — happy and thrice-to-be-envied poet to have his verse thus immortalized in bronze! — with the refrain in larger letters in one line under the whole: —

> Lieb' Vaterland, magst ruhig sein,
> Fest steht und treu die Wacht am Rhein.
> (Dear Fatherland, thou needst not fear,
> Stands firm and true thy Rhine-watch here).

On one side of the socle which bears the above described front façade another magnificent relief group represents the departure of the soldiers for the war, and their affecting leave-taking of parents, wives, and children; while on the other side is a similar portrayal of the return home of the laurel-crowned warriors. Above the Emperor, and in front of a second die, sits perched a huge eagle — nearly 2½ metres high — with outstretched wings and the Imperial shield on breast, while round the socle are hung the arms of all the chief States of Germany, above them being the iron cross, with various sorts of wreaths and garlands; and surmounting all, the colossal far-flashing statue of *Germania* — powerful, victorious, and proud. From the socle to the crown the monument measures about 25 metres. The *Germania* itself has a height of nearly 12 metres, and weighs 700 cwt. Its little finger can be spanned by two adults only; its thumb-nail is 7 centimetres broad and 11 long. A man can creep through the hollow of the wrist, and inside the lower part of the body, ten couples can conveniently dance. The sword is 8 metres long, and weighs from 5 cwt. to 6 cwt. That the monument should have been devised and completed in all its parts within eight years is justly regarded as a brilliant proof of German industry and perseverance. The technical and architectural difficulties to be overcome were immense. For the building of the lower part of the edifice stones of immense weight — some of them all the way from the Leutoburger Wald, weighing 900 kilogrammes — had to be dragged up the Niederwald slope by teams of a dozen and eighteen horses. For the modelling of the various parts of his masterpiece, Professor Schilling, of Dresden, had to erect huge scaffoldings; and when finished they were distributed among various German foundries to be cast. The moulding of the *Germania* fell to the lot of Herr von Miller, of Munich, and when triumphantly turned out, like Schiller's "Bell," the question was how to transport it to its destination — by road or rail? The latter method being eventually chosen, the various portions of the statue were conveyed with laborious precaution as far as Rosengarten, opposite Worms, where legend fables the Nibelungen Hoard to lie embedded in the Rhine's pellucid depths, and there "the epic in bronze and stone" was confided to the river. Ringing cheers and salvos of cannon greeted the huge barge and its precious burden all down the Rhine to Rüdesheim, where it safely arrived, and was gradually hauled and pushed up the Niederwald slope by strenuous and sweating teams of men and horses. But would the scaffolding bear the weight of the colossal metal fragments that had to be hoisted aloft? This was first successfully tested by the swinging up of 11,000 kilogrammes of iron rails, then the main portion of the *Germania*, weighing 8,500 kilogrammes, was carefully elevated; and within a month of their removal from Munich, all the pieces had been triumphantly raised on high and fitted together. Though attended with great difficulty and danger the laborious enterprise was accomplished without any loss of human life, the only serious mishap that marked its progress being the overthrowing of a heavy scaffold crane by a thunderstorm.

Such is a brief sketch of the work, but brief as it is it will speak volumes for the workman who will henceforth take rank with the world's greatest masters of plastic art. Professor Johannes Schilling, of Dresden, the Florence of the North, is a Saxon by birth, and was born in 1828. After studying with Rietschel he made his début as a sculptor in 1851, with a beautiful group — "Amor and Psyche." Working then at Berlin with Drake — the artist of the Victory Column — he produced a pair of relief medallions, "Jupiter" and "Venus," which procured him a travelling scholarship; and the result of the two years' residence in Italy which he was thus enabled to spend were his "Wounded Achilles" and his "Centaur and Venus." Returning to steady industry at Dresden, he turned out in rapid succession a variety of high productions; and on the death of Rietschel undertook the execution of the City of Spiers figure for the Luther Monument at Worms. Tourists will remember with equal admiration his "Four Seasons" on the Brühl Terrace at Dresden, his Schiller statue at Vienna, his Maximilian statue at Trieste, and his War Memorial at Hamburg, not to mention other creations, which have now all been surpassed and crowned by his Niederwald monument — a work which will immortalize its author as it will perpetuate the memory of the events whereof it is the record in eloquent marble and breathing bronze.

The National German Monument has cost £59,600. The principal expenses were as follows: site, £5,650; custodian's house, £990; garden, £1,750; pedestal, £16,750; candelabra and inscriptions, £450; models, £10,500; statue of Germania, £8,787; War and Peace, £3,000; Rhine and Moselle group, £1,750; escutcheons, £544; eagle and wreaths, £1,347; large reliefs, £2,565; small reliefs, £1,065; supervising architect, £1,550; competition, £1,350; and administration, £1,550. — *The Architect.*

WHAT SHOULD THE AMERICAN ARTIST PAINT?

AN article in your issue of October 20, entitled "A French Critic on Current French Art," suggested many thoughts that have long lain dormant, and only needed the justification of such an article to see them in print. What I now write is not written in any controversial spirit; for there are many nuggets of wisdom in M. Bigot's observations, which, by the way, Mrs. Van Rensselaer has deftly rendered in English. I merely use the article for a pretext — a *raison d'être* for discussing a subject of vital importance to the world of art, and, by analogy, to the world of letters. The boundary lines betwixt art and literature have been so definitively drawn by Lessing, in the "Laocoön," that anything any one might write thereon would be purely an act of supererogation. What M. Bigot says is to the point, but for a fuller exposition of the fallacies of literary art, let the reader turn to Lessing's pages.

What should an artist paint? He should paint what he feels when his choice is free, and should feel his subject when it is not free. Better the timely renunciation of an unfelt scheme, than disastrous discomfiture in its execution. To counterfeit the feeling of others will not suffice; Mrs. Van Rensselaer signals this danger to our artists abroad. Rather be a *bona fide* American than a sham Frenchman. Our feeling for subjects indigenous to France is but cultivated, the feeling of a feeling. Let our transatlantic students stock their minds with the experience of the past and the present; let them saturate themselves with the great creations of the great schools, — never neglecting Italy of halcyon days, — and then let them return home to adapt themselves to their native environments — environments far more suitable to their physical, mental and artistic growth than those of foreign climes.

To stake out the confines of pictorial subjects, except perhaps where they trench on literature, is dogmatic, and dogmatism either in art or literature is to be deplored. The creative power should be allowed the widest range. The excesses of a few will be more than counterbalanced by the conservative variety of the many. To say that modern art should confine itself to contemporary life is to shackle it with chains as ponderous as those of the official academy. Many a sweet and poetic imagination would die of inanition. What does inspiration mean? Does a man chase an inspiration? As well chase a shooting-star. The inspiration comes to a man, is breathed into his being, germinates there, and manifests itself objectively through the medium of his controlling hand. Say to that man: "Receive only the impressions of the life about you, only of what you see and hear," would be almost tantamount — almost — to saying: "Shut out every entrancing souvenir of the past, every mystic vision of the future, every dream of the beautiful, the creative, the heroic." Men will eternally feel such subjects; the number and calibre of those who have felt them is significant. Realism or no realism, will the time ever come when life-worn human nature will cease to yearn for the ideally beautiful? Fancy how exquisitely, yet profoundly, a few bars of noble music agitate us; yet nothing is more purely ideal than music. We are as keenly sensitive to the abstractly beautiful to-day as we ever were, though we may be more modest in the expression of our sensibilities. "Contemporary life," by all means, especially for those who feel it; but contemporary life alone means the ostracism of many generous natures, and these not the least intelligent, from the ranks of art. Take care, or those ranks will be metamorphosed into a well-trained legion of hewers-of-

wood. Millet painted the peasant because he felt the peasant, because he *was* a peasant; but isn't it rather mortifying to see a band of intelligent young fellows who do not feel peasants, and are not peasants, painting peasant life? Peasant life is picturesque, of course, and interesting as all human nature is interesting; but picturesqueness is but a small factor in art, and should be reserved for men of commensurate inspiration. I do not for an instant mean to confound the study of life, high and low, as a means — all the celebrities did that — I am referring now to the depicting of picturesque life as an end.

Primarily it is the *style* that is the epoch, not the subject. Certain subjects of course have their cycles of popularity, but the distinguishing characteristic of any particular epoch is the style. The gods of Rome and of the Renaissance claim the same nomenclature, but what else have they in common? They were the mere vehicles of current ideas and current methods. Giotto limned the Madonna, so did Raphael, and the epoch has indelibly limned her signature to either work. Greek following Greek sculptured the same divinity, each perfecting his predecessor's work, till perfection was attained, and scholarly archæology, thanks to the style, has classified them all. Did the Hellene hesitate to draw his inspiration from the chaotic past? True, he pictured contemporary life as well — manly, athletic contemporary life; the two things were not inconsistent. We, by the way, might well imitate them in their choice of contemporary life, pictorially the grandest phase of it, not the meanest; for we, too, have our high-bred athletes. The mighty men treated subjects as hackneyed as any of to-day, probably much more so. Little recked they; *to see them well* was their problem. These stale topics gave them opportunities for artistic expression that no contemporary life could have offered. Who could confound the Antigone of Vittorio Alfieri with the Antigone of Sophocles? Yet we could ill spare either. Is George Eliot's "Romola" less precious or less modern because the scene is laid in the Florence of Savonarola? Could Henry Esmond be spared? What could be more shop-worn than the plots of Shakespeare? Yet who cares? They are but the media of his thoughts. His style rings with the life about him. When the style is shop-worn, too, then all is hopeless.

The Academy fell into disrepute not altogether because the subjects grew stale — this was an effect rather than a cause — but for the reason that the style became hopelessly conventionalized, absolutely foreign to anything like nature; no one dreamed of looking at her through his own eyes. Even the Academy inculcated some sage doctrines, well known to monumental artists, and respected by them, which have been smothered in the general entombment. A picture now on exhibition in this city, by Regnault, "Automedon, the Horse-Tamer," an heroic poem, tingling with inspiration, is really the Academy's offspring. Not that it is cold and bloodless as its children were a half-century ago; we are too intimate with nature, now-a-days, for anything of that sort — the glacial period has long since passed — but the forms of Automedon are eloquent with the happiest maxims of the schools whose tendency abroad has been to encourage epics, which but few individuals have the hardihood to undertake on their own responsibility in this country. The truth is we are not now and here in love with form, a love that generally comes with knowledge, and is far less intuitive than the love of color. At times one almost fears that drawing — not purely imitative drawing, but artistic drawing — will be relegated to the realms of the lost arts. Decoration may yet save us, for monumental work implies purified, dignified and well defined forms. Monumental artists must respect certain traditions, their inspirations of course being drawn from Nature; any attempt to the contrary, when the novelty is worn off, will prove a failure, especially when it is borne in mind that each generation in matters of taste is anything but charitable towards its immediate predecessor.

Traditions menace us but little. We are free, self-reliant, and in constant intercourse with nature. We are in entire sympathy with the revolution organized by Constable, Corot, Rousseau, Courbet, and their successors. But the revolutionists must not overreach themselves; their remedies may prove too drastic. As I have just observed, there is no fear that we shall be too academic; our danger lies in an opposite direction. The picturesque element is now in vogue. Impressionism, to which we owe much, and naturalism, are opening the ranks to all sorts and conditions of men and women, who are not content with the humbler emoluments of art — with the industrial arts for a profession, so much more sympathetic to people of taste than the non-artistic trades; men and women who have neither the ability, perhaps, to think a noble thought, nor the patience to learn to express it. Art-schools tell this story to those who know them well. This is plain talking; but we ought to rid art of all its glamour when we counsel possible aspirants to artistic fame. There is going to be, if there is not already, a disastrous glut in the art-market, and a cruel selection of the fittest.

That picturesqueness is in the ascendancy merely means that it claims for itself a majority of artists; but in art, as in politics, there should always be an opposition, an intelligent minority. This is the day of liberalism. There should be the same catholicity in art as there is in religion. Let us have all things as men feel them. Let us have the epic — if by great good luck we can have it — and the historical; let us also have naturalism and impressionism. Each will work to the advantage of the other, just as water-colors have worked to the advantage of oils, though there was a time when they sought to devour one another. The past has told its story too well, servilely to imitate its style. Though we have lost in many respects, perhaps the most important, we have gained in others. There may be a little less formal art, but there is a great deal more nature. We have gained in quality, in texture, in light. It seems as though the genius of art had said: "Let there be light." Little matters it what we paint — saints, nymphs, peasants, or clerks — provided we inundate them with our modern life and light. In the broadest significance of the word, we are about as religious to-day as we ever were — more religious, perhaps — and it is safe to say that we can paint religious subjects with as much feeling, certainly, as did the pagan painters of the Renaissance. They felt their subjects æsthetically; so can we. We can also feel them religiously, not superstitiously. Mythological subjects are but the vehicles of a phase of artistic feeling difficult to express in other ways. Why eliminate them? Why eliminate any true inspiration? However much any one may yield the preference to contemporary life, let him deem it but a preference, not a formula. The imagination is too subtle, too freakish, ever to be guided within restricted bounds. Such a guidance would be but a repetition of the fatal error of the Academy, and art would become monotonous and tiresome. The distance-levelling inventions of modern times have already tended to induce uniformity. Decentralization has always been more fruitful in good works than centralization. Diversity of subject should be encouraged rather than discouraged, and contemporary life, while influencing all of us at all times, should only be depicted when we are in the mood for it. However, all preaching and writing to the contrary notwithstanding, pretty much every artist will paint what he wants to, which is equivalent to saying that he will paint what he feels.

Frederic Crowninshield.

SANITARY PLUMBING.[1] — VII.

(*e*) "SIPHON"-CLOSET.

Figures 16 and 17 represent a type of closet in which the wastes are discharged by siphonic action. A weir-chamber is used below the trap to assist in charging the siphon.

In Figure 16 the weir-chamber is shown below the floor, and made in a separate piece from the rest of the closet. In Figure 17 the weir-chamber is placed above the floor, and made in a single compact piece with the rest of the closet.

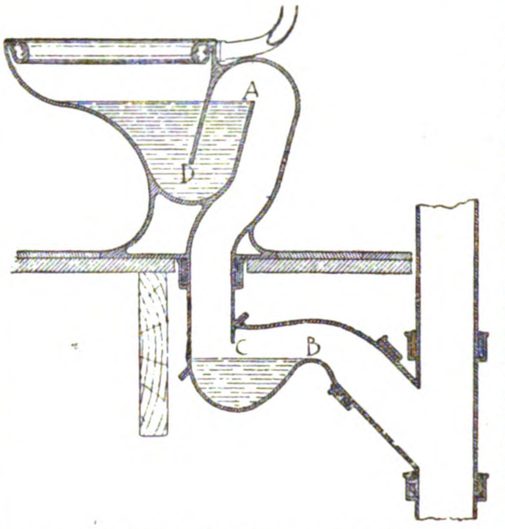


Fig. 16.—"Siphon"-Closet with Water-Chamber below Floor.

In order to charge the siphon the water is let into the basin through the supply-pipe and the flushing-rim until it overflows the outlet of the trap, and falls into the weir-chamber below. If the quantity is sufficient it closes the inlet of the weir-chamber before it can escape through the outlet. This prevents air from entering the siphon. The air already there is carried out by the current of water, and the siphon is formed. As soon as the water in the bowl descends to the bottom of the dip of the trap air follows it and breaks the siphon; then the contents of the weir-chamber fall below the inlet, and allow the air again to enter the siphon: the bowl is refilled by the after-wash.

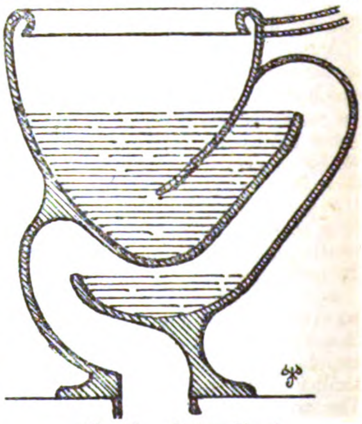


Fig. 17. — Siphon-Closet.

These closets are ingenious, and so far as the writer's experience with them goes, the better forms produce invariably the siphonic action in the manner described; but since the siphon is broken when the water reaches the bottom of the dip of the trap, a portion of the soluble and lighter parts of the waste matters must return to the bowl, and may fail to be removed by the after-wash. Nevertheless, a strong and well-regulated after-flush may remedy this defect, and the improved forms are certainly to be preferred to any closet heretofore described.

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[1] Continued from page 200, No. 409.

(*f*) "WASH-OUT" CLOSET.

Wash-out closets are those in which the basin is made to hold a certain quantity of standing water while the trap is placed below its level, usually entirely below the bowl. The outlet from the basin into the trap is above the level of the standing water. Hence, these closets are sometimes called "side-outlet" closets.

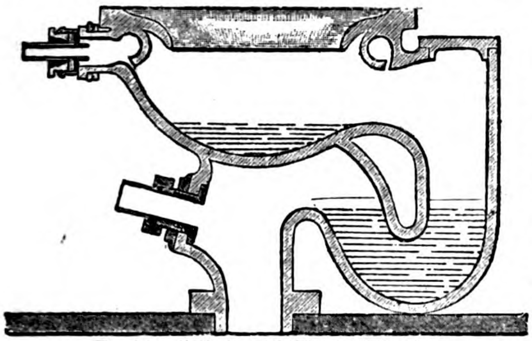

Fig. 18.—"Wash-out" Closet, all Earthen.

In Figure 18 is shown a wash-out closet made of a single piece of earthenware, and having the supply-pipe opposite the outlet into the trap.

In Figure 19 the same kind of closet is shown with an earthenware body and an iron trap, and having the supply-pipe in the rear. These closets have of late become the most popular of the sanitary water-closets. The flushing stream sweeps across the bottom of the bowl with irresistible force, and drives everything before it into the trap. Whether or not the trap itself be emptied depends upon the length of time the flushing is continued after the bowl is cleared. In consideration of their simplicity, and of their uniformity and certainty of action, they are to be placed even higher than the last.

Unfortunately, however, they have several serious defects, of which some might be remedied, while others are inherent in the principles of their construction and operation.

Most important of these is the faulty method by which they are connected with the drain-pipe. In the majority of these closets, as also of all the hopper-closets, except the siphon-closet, Figure 16, (whose connection with the soil-pipe is made on correct scientific principles,) this connection is so made that a shrinkage or settlement of the floors is extremely likely to cause a leak. Most of them depend upon the strength of an earthenware flange to receive the pressure of the screws or bolts by which this joint is tightened up. Such a material is totally unsuitable for such a purpose. An iron flange-joint, such as is used for steam-pipes, is the only one proper for this purpose.

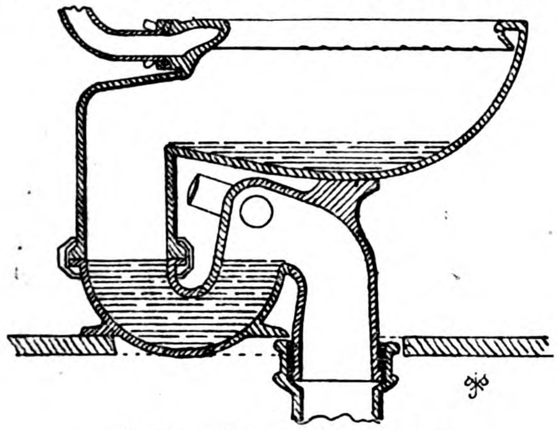

Fig. 19.—"Wash-out" Closet: Iron Trap.

A *second* important defect of this, and all the other hopper-closets thus far mentioned, is the excessive noisiness of their flushing.

A *third* defect lies in the extravagant consumption of water. The power is not scientifically applied to good advantage. Of the water which rushes across the basin only a portion takes effect directly upon the waste matters; the rest spends its force upon the sides and back of the bowl to no advantage, and rebounding amuses itself in twirling the lighter substances about in small eddies for a time before it shoots them into the trap.

In a perfect system of flushing no water should be wasted. Every drop should serve a useful purpose, and devote its entire energy to ejecting the wastes and the wastes only, solid and dissolved, but not the pure water.

A *fourth* defect is in the presence of the extended pipe surface between the basin and the trap, and of its upper corners near the clean-out opening, which partakes of the nature of a receiver. It would be better if this dry pipe or canal were not required. The smaller and more compact the surface of a water-closet is the better. The trap is deep and somewhat inconvenient of access when it is necessary to empty it of its water, as is the case with water-closets of summer residences which are to remain unoccupied during the winter.

A *fifth* defect, not often touched upon by sanitarians, is the length of time required for flushing. The water does not begin to act until quite an appreciable time after the handle has been pulled, whereas its action should be instantaneous, and the flushing be complete even though the handle be immediately released, otherwise, in many cases of careless usage the flushing will be neglected.

A *sixth* defect is in the spattering occasioned by the violence of the water-flow of these closets.

A *seventh* defect is in the position of the trap, being such that the water is partially and in some of them wholly out of sight, so that it is impossible to know the condition of its contents, or even if it retains its water-seal.

An *eighth* defect is in the unfitness of its material.

A *ninth* is in the want of a tight and rigid frame for its protection, connections and support of its seat.

A *tenth* is in the want of any provision to restore its water-seal in case of its loss through evaporation, siphonage or other causes.

An *eleventh* is the want of any provision for conveniently emptying all parts of the closet of water, as is desirable in summer residences in case of disuse during the winter, or at times of severe frost, and leaving the trap secure against the entrance of sewer-gas.

Finally, a *twelfth* is the difficulty and expense of accurately moulding and baking the earthenware, of which hopper-closets have hitherto been made, in pieces large enough to serve the purpose for which they are intended.

These defects are none the less important because custom has rendered many of us oblivious to them. We have, therefore, made an effort to remedy them, with what success will be seen in the next chapter.

BOOKS.

BUFFALO, N. Y., October 29, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Gentlemen,—Will you kindly state how soon we may expect the publication of the papers on "Building Superintendence," in book form? Very truly, G. F. H. BARTLETT.

[*Building Superintendence* was published last week and can now be obtained of Messrs. James R. Osgood & Company. Price $3.00.—EDS. AMERICAN ARCHITECT.]

NEW YORK, October 27, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Will you please oblige me by letting me know the names of best books on architecture for one to read who has just started to learn the profession? J. B. B.

[FOR the history of architecture read *Fergusson's History of Architecture;* for architecture in all its branches procure *Gwilt's Encyclopædia of Architecture* and *study* it; for American practice read and study *Building Superintendence* by Professor T. M. Clark; for perspective drawing the best and most complete work is Professor Ware's *Modern Perspective.* The last two books are published by James R. Osgood & Co., for $3.00 and $5.00 respectively. The first two can beordered through any importing book-dealer, and cost about $15.00 each, though second-hand sets can often be obtained for less.—EDS. AMERICAN ARCHITECT.]

INDIANAPOLIS, IND., October 30, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Gentlemen,—I would like to obtain Durand's works; as I already wrote to Ducher, Paris, from whom I received the answer that they could not be had, I would be very glad if you could inform me where they may possibly be had, also Viollet-le-Duc's *Dictionnaire Raisonnée.*

Should there be no chance to get Durand's works would you be so kind as to name me a similar work to *Leçons d'Architecture, Partie graphique des cours d'Architecture?* If so, please state price. My best thanks for all the information you can give me.

Respectfully yours, HENRY GIBEL.

[DURAND'S *Parallēle,* the best known work, is easily obtained. Write to B. T. Batsford, 52, High Holborn, London, W. C. The price will be about 35 shillings, with duty added here. Viollet-le-Duc's *Dictionnaire Raisonnée* can be had at the same place second-hand, for about 10 pounds, bound. New, it costs here $65, unbound. To be had of A. Levy, 4 Bond Street, New York, or through any other foreign bookseller.—EDS. AMERICAN ARCHITECT.]

THE REJECTION OF COMPETITIVE DESIGNS.

BOSTON, MASS., October 29, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—As a subscriber to your valuable journal I desire to get your decision on the following. In submitting plans for a public building under a published call (with no reserve or right to reject), building to cost $5,000, have the committee the right to adopt a plan which, knowingly, will cost much in excess of that amount, and reject all others of equal merit; and what redress have the competitors, providing their designs show equal merit, and come within the amount specified? Please answer in your next issue, and oblige,

Yours truly, ARCHITECT.

[EVERYTHING depends upon the terms of the published call, which forms a valid contract with all who accept the invitation. It would, however, under most invitations of the kind, be difficult to show that the committee had not a right to adopt a plan costing indefinitely more than the limit they themselves set, or to give the "job" to a brother Freemason or political friend, and confiscate all the designs of the unsuspecting dupes who were foolish enough to send them in, for their favorite's benefit. When architects realize the fact that their services are worth paying for, and will be paid for if they cannot be had on other terms; and that in order to secure adequate remuneration and honorable treatment from those who desire their help they have only to refuse to give it until they know positively what they have to expect, we shall see the beginning of the end of the sordid frauds upon feeble-minded architects which burlesque the name of competitions.—EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

Electric Railways in Vienna.—The project of a high-level railway for the city of Vienna has failed because the capital could not be raised, and the Austrian Government has now granted Messrs. Siemens and Halske a concession for the preparatory works for a net of electric railway lines, by which communication in the city would be greatly facilitated. The contractors will have three distinct periods wherein to build the railways. The first will comprise the completion of a line from the central town to the Danube Canal and several suburbs through which no tramways go at present. The same firm some time ago opened a small line of electric railway to the Electric Exhibition, which was so great a success as to induce two syndicates of banks—the one represented by the Länderbank, the other by the Vienna Banking Union — to offer to find the necessary capital for the new undertaking, namely, 40,000,000 to 50,000,000 florins.—*St. James's Gazette.*

M. Poelart and the Brussels Palais de Justice.—The fate of M. Poelart, the architect of the new Palais de Justice, at Brussels, remarks the *Pall Mall Gazette*, has been curiously like that of Mr. Street, the archiect of the newt Law Courts in London. In each case the most prominent architect of his generation has died, leaving his crowning work unfinished. Joseph Poelart was the favorite pupil of Visconti, the architect of the Louvre, and he became city architect of Brussels in 1856. It is said that a new Palais de Justice was the dream of his life, and that when the Commission waited on him at last with a request that he would commence the plans of such a building, he simply opened a portfolio and replied, "*Le plan demandé, le voila.*" The fact was that for ten years he had been working in silence on the project, which he felt must come before him sooner or later. The first stone was laid in 1866. In all, Poelart dedicated fifteen years of his life to this work.

The Production of Siena Earths. — Consul Colnaghi, in his report on the mineral products of the province of Siena, says that Siena earths, known also under the names of ochre, bole, umber, etc., are considered by some mineralogists to be ferruginous clays, by others, minerals of iron. They are chiefly found in large quantities in the communes of Castel del Piano and Arcidosso. The yellow earths and bole found on the western slopes of Monte Amiata are true lacustrine deposits found amid the trachytic rocks, of which it is principally composed. They lie under, and are entirely covered by the vegetable soil. Varying in compactness and color, they are termed yellow earths when of a clear ochreous tint, and *terra bolare*, or bole, when of a dark chestnut color. Each deposit consists for the greater part of yellow earth, beneath which bole is found in strata or small veins. The mineral being very friable, its excavation is easy, and is generally conducted in open pits. The different qualities are separated during the process, the bole which has the higher commercial value being the more carefully treated. After the first separation the bole is further classed, into first, second, third, and intermediate qualities — *boletta, fascia, cerchione*, etc. Its most important characteristic is termed, in commercial language, *punto di colore*, or tint. The value of the bole rises as its tint deepens. Thus bole of the third quality is lighter than that of the second, and the second than that of the first. After the third quality comes the *terra guilla*. The yellow earths, after excavation, are exposed to the open air for about a year, by the pit side, without classification. The bole, on the contrary, is placed in well ventilated storehouses to dry for about six months. This diversity of treatment is owing to the fact that exposure to the elements brightens the color of the yellow earths, and raises their value, while it would damage the bole by turning its darker tint first into an orange yellow, and if continued, into an ordinary yellow earth. It also loses in compactness and crumbles up under exposure. In addition to the *punto di colore*, the size of the pieces influences the commercial value of the bole, which increases with their volume. Thus the classification is *Bolo pezzo, Bolo grapolino*, and *Bolo polvere*. The yellow earths are classed as *Giallo in pezzi, Giallo commune*, and *Giallo impalpabile*, the impalpable being worth more than the common yellow. The production of the Siena earths is estimated at about six hundred tons per annum, of which amount about fifty tons are calcined, and the rest sold in their natural condition. The value of the trade is estimated at from £4,000 to £6,000. — *Journal of the Society of Arts.*

The Temples Destroyed in Java. — About the middle of the island, but not given on ordinary maps, there is a group of very remarkable old temples. Their position may be roughly understood by a reference to any map of Java, by drawing a line south of Samarang to the other coast, where a river will be found called the Progo, and on the east of it there is a town which has a variety of spellings, but it may be written Djockjakarta — the Dutch call it "Jockio" — this place is also mentioned as having suffered seriously. About thirty-five miles from Djockjakarta is the great temple of Boro Buddor; also called Boro Bodo, and Boer Buddha. The dome of this monument is stated to have been crushed in by falling rocks. The temple does not stand on the side of a mountain, but on the top of a hill, so this could not have resulted from masses of rock rolling down upon it. The destruction must be ascribed to huge fragments having been thrown into the air and then descending with terrific force. There is a picture of Martin's in which the top of a mountain is rolling over, but extreme as that is, it represents a tame landscape in comparison to the wild Walpurgis which went on in Java. Boro Buddor is by far the largest and greatest monument of the Buddhist religion in the East. The temple of Nakon Wat in Cambodia is the only other that can be put in comparison with it. The base is square, and each side is about four hundred feet long. The upper portion is circular and about one hundred and fifty feet in height; there is one central dome and there are seventy smaller ones. On the terraces round it there are between four and five hundred chapels, each with a statue of Buddha in it, seated in the usual cross-legged position. The sides are covered all round with bas-reliefs on each terrace: one terrace has one hundred and twenty subjects, which embrace the whole history of Buddha. The temple is a solid mass of masonry, and is of the same kind as the Dagobas of Southern India or the Topes of the Northwest. Luckily, the Dutch Government some few years ago had it all carefully measured and drawn, and the whole has been published in a large folio volume. The first notice of this temple was given by Sir Stamford Raffles, who at the time stated that "the interior of Java contains temples that, as works of art, dwarf to nothing all our wonder and admiration at the pyramids of Egypt." Miss North has lately painted pictures of Boro Buddor on the spot. About twenty miles southeast of Boro Buddor is a place called Brambanam. This is the site of the ancient capital of Java, and there are a very large number of temples standing, which have more or less suffered from former earthquakes. One of the celebrated groups at this place is known as the Chandi Siwa, or the "Thousand Temples." This is also said to have suffered. There is a volcano somewhere near to these and to Boro Buddor, called Mt. Merapia, which has probably been the active agent in this case. About two miles and a half from Boro Buddor there is an interesting temple called Mendoet, but it has not the reputation of those already mentioned, and it has not been alluded to as yet in the fragmentary intelligence which has come home. It is only a fertile or rich country that can produce large and elaborate temples. Java possessed the necessary qualifications and her temples have been a wonder to all who have seen them. —*London Daily News.*

Spontaneous Combustion. — Mr. C. T. Holloway, Fire Inspector of Baltimore, recently cited in a paper on spontaneous combustion read before the Convention of Pennsylvania Firemen, the following cases, which, though highly tinctured with romance, yet are said to be literally true, and are new instances of the existence of the much criticised reality of spontaneous combustion: —

"Countess Cornelia Zangari and Bandi, of Cesena, of Italy, who was in the sixty-second year of her age, retired to bed in her usual health. Here she spent about three hours in familiar conversation with her maid and in saying her prayers, and having at last fallen asleep, the door of her chamber was shut. As her maid was not summoned at the usual hour, she went into the bedroom to wake her mistress, but receiving no answer, she opened her window and saw her corpse on the floor in the most dreadful condition. At the distance of four feet from the bed there was a heap of ashes; part of the body was half burnt, the stockings remaining uninjured; most of the body was reduced to ashes. The air in the room was charged with floating soot (animal carbon). The bed was not injured. From an examination of all the circumstances of the case, it has been generally supposed that an internal combustion had taken place; that the lady had risen from her bed to cool herself, and that on the way to open the window the combustion had overpowered her and consumed her body by a process in which no flame was produced which could ignite the furniture or the floor.

"Still more wonderful and awful is the assurance that the wife of Dr. Treilas, physician to the late Archbishop of Toledo, Spain, emitted inflammable perspiration of such a nature that, when the ribbon she wore was taken from her and exposed to the cold air, it instantly took fire and flashed with sparks of fire like a lively 'Roman candle.'

"Professor Hafmeister, in the Berlin Transactions, 1876, records a case of the same nature respecting a peasant, whose linen took fire, whether it was laid up in a box when wet, or hung up in the open air.

"A case of this kind recently occurred at the Abattoir in Jersey City. During the recent spell of hot weather one of the workmen threw off his blue linen blouse, smoking with perspiration. It was hung up in the ice house. In a few minutes it burst forth into a coruscation of sparks and literally consumed itself."

The Emperor of China at Home. — The ruler of the 250,000,000 of which the Chinese nation probably consists is now within five years of his majority, and is an occupant, while yet a minor, of the same apartments in which lived the Emperor who preceded him on the Dragon Throne. The building in which the Emperor resides, says the *North China Herald*, is called Yang Hsin Tien, and is a little to the west of the Ch'ien Ch'ing Mêu in the middle of the palace. At the back of the central gate, on the south side, is the great reception hall. When Ministers of State and others enter for an audience at four, five, or six in the morning, according to custom, they have to go on foot to the centre of the palace over half a mile, if they enter by the east or west gate; and when they get on in years they can appreciate the Emperor's favor, which then by a decree allows them to be borne in a chair instead of walking. The rooms of the Emperor consist of seven compartments. They are provided with the divan or *k'ang*, the peculiar institution of North China. The *k'angs* are covered with red felt of native manufacture, and the floor with European carpets. The cushions all have embroidered on them the dragon and the phœnix. The rooms are in all thirty yards long by from eight to nine yards deep, and are divided into three separate apartments, the throne-room being the middle one. Folding-doors ten feet in height open into each of these apartments to the north and south in the centre of each. The upper part of these doors is in open-work, in which various auspicious characters and flowers are carved. At the back paper is pasted to admit light to the rooms. The front is ornamented with gilding, sculpture, and varnish of various colors. These doors remain open even in winter, because during that season a thick embroidered curtain of damask is hung in the doorway, which by its weight keeps its place close to the door-posts and prevents cold air from entering. In summer this is replaced by a curtain admitting the breeze on account of its being made of very thin strips of bamboo. The silk threads used in sewing the strips of bamboo together are of various colors, and passing through the whole texture of the curtain from the top to the bottom are very agreeable to the eye. These summer and winter curtains are rolled up to give air to the rooms when required. Exit and entrance are effected on each side of these curtains by side doors. Along the whole front of thirty yards there is a covered flight of steps fifteen feet wide. The roof over this rests on two rows of pillars. The pillars shine with fresh vermilion both within the rooms and on the steps outside, and are decorated with sculptured work, partly gilt and partly varnished.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

287,409. Sash-Fastener. — Frederick Bell, Anderson, Ind.

287,410. Fire-Escape. — Charles F. Bierbach, Milwaukee, Wis.

287,413. Sewer-Trap. — Jacob Bodine, Jersey City, N. J.

287,432. Brick-Kiln. — Frances L. Hall, Oneida, N. Y.

287,434. Ventilation. — Alfred J. Hendry, Darlot, Ga.

287,467. Fire-Escape. — Newman J. Powell, Pontiac, Ill.

287,477. Ventilator. — Wm. Schmolz, San Francisco, Cal.

287,480. Metal-Ruler. — Chas. A. Smith, Providence, R. I.

287,491. Fire-Escape. — Frank R. Woodward, Hill, N. H.

287,492. Fire-Escape. — Frank R. Woodward, Hill, N. H.

287,510. Plumber's Trap. — Fredk. N. Du Bois, New York, N. Y.

287,538. Bit. — Edward Hall, Elkhardt, Ind.

287,540. Fire-Escape.—Andrew J. Heavner, Pittsfield, Ill.

287,549. Safety-Elevator.—John W. King, Lambertville, N. J.

287,552. Fire-Proof Partition-Block. — Martial Lapersonnerie, New York, N. Y.

287,553. Chimney-Cap. — Francis H. Leonard, Boston, Mass.

287,558. Water-Closet. — Samuel G. McFarland, New York, N. Y.

287,560. Fire-Escape. — Jos. A. Miller, New York, N. Y.

287,584. Plane. — Solon R. Rust and Arthur R. Rust, Pine Meadow, Conn.

287,590. Hatchway for Elevators. — William Stevens, Philadelphia, Pa.

287,598. Fire-Escape. — William H. Welsh, Erie, Pa.

287,612. Plane. — Henry B. Beach, Meriden, Conn.

287,632. Sheet-Metal Roof-Valley. — Chas. B. Cooper, Nashville, Tenn.

287,647. Lightning-Arrester. — Josiah W. Dyer, Philadelphia, Pa.

287,648. Machine for smoothing Stones.—John Eger, Chicago, Ill.

287,668. Elevator-Lock.—George A. Grover, Boston, and Edwin E. Worden, Somerville, Mass.

287,712. Blind and Shutter. — Harvey L. Page, Washington, D. C.

287,715. Door-Latch. — Edward N. Porter, Burlington, Vt.

287,747. Fastener for Meeting-Rails of Sashes. — Edwin R. Wethered, Woolwich, County of Kent, England.

287,757. — Thermostatic Fire-Indicator.— Richard N. Dyer, New York, N. Y.

287,764. Fire-Escape.—Chas. Ives, Kirkland, N. Y.

287,770. Steam-Radiator.—Silas H. Morrill, Geneva, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Since our last report twenty permits have been granted, the more important of which are the following: —

M. Dailey, three-st'y brick building, w s St. Paul St., n of Lanvale St.

J. C. Pencil & Bro., two-st'y brick building, w s Sharp St., between Stockholm and Ostend Sts.

Boston Fear, three-st'y brick building, e s Fulton Ave., n of Patterson Ave., and 4 three-st'y brick buildings, w s Fulton Ave., n of Patterson Ave.

P. McGuire, three-st'y brick building, e s Pine St., between Baltimore and Raborg Sts.

Samuel Bealmear, two-st'y brick building, n s New Church St., rear of No. 82, s s Lexington St.

Wm. T. King, 11 three-st'y brick buildings, n s Mulberry St., between Mount St. and Vincent Alley; and 3 three-st'y brick buildings, e s Mount St., between Mulberry and Saratoga Sts.

Jackson Musselman, 3 three-st'y brick buildings, e s Druid Hill Ave., n of Robert St.

Max Plitt, 6 two-st'y brick buildings, w s Division St., s of Robert St.; 6 two-st'y brick buildings, e s Boulder Alley, rear of above; and 3 two-st'y brick buildings in alley in rear.

Boston.

Surgical Ward.—A surgical building, 40′ x 80′, is now building for the Massachusetts Homœopathic Hospital. It will be four stories high, of brick and stone. D. Connery for the mason-work, and L. Greely for the carpenter-work are the contractors.

A two-st'y fire-proof boiler-house and laundry, 45′ x 45′, is being built by the same contractors; Messrs. Allen & Kenway, of Boston, are the architects.

Building Permits. — *Brick.* — *Washington St.*, rear, nearly opposite Albano St., Ward 23, for Marcus Ammidown, stable, 10′ x 15′, one-st'y pitch; M. Ammidown, builder.

Wood. — *Gerard St.*, near Farnham St., Ward 20, for A. N. Shurtliff, 2 stables, 25′ x 40′, two-st'y flat.

Gerard St., cor. Farnham St., Ward 20, for John W. Chandler, stable, 25′ x 40′, two-st'y flat.

Washington St., cor. Baker Ave., Ward 24, for John Whitten, dwell., 14′ x 14′ and 23′ x 30′, two-st'y pitch; Leander Wilkinson, builder.

Centre St., rear, opposite Bellevue St., Ward 23, for Hannah D. Richards Estate, storage, 12′ x 25′, one-st'y; Geo. A. Spear, builder.

Byron St., between Pope and Saratoga Sts., Ward 1, for Edw. P. Flanagan, dwell., 12′ x 15′ and 20′ x 30′, two-st'y mansard; Edward J. Turner, builder.

Armandine St., rear Washington St., Ward 24, for Esther J. McDowell, dwell., 14′ x 15′ and 22′ x 28′, one-st'y pitch; M. H. Jackson, builder.

Cook St., Nos. 18 *and* 20, Ward 4, for Augustus F. Dickson, 2 dwells., 20′ x 32′, three-st'y flat; Augustus F. Dickson, builder.

Brooklyn.

Building Permits. — *Park Pl.*, s s, 210′ e Classon Ave., 6 two-st'y brick dwells., gravel roofs; cost, each, $3,500; owner, Adam Ferris, 498 Macon St.; architect, E. Mason; builders, Ferris & Ramsdall.

Luqueer St., No. 155, three-st'y brick tenement, tin roof; cost, $4,000; owner and builder, Thos. Keogh, 149½ Nelson St.

Hancock St., s s, 290′ w Marcy Ave., 3 three-st'y brick dwells., tin roof, iron cornice; cost, each, $9,000; owner, Geo. H. Stone, 301 Jefferson St.; architect, G. A. Schellenger.

Fulton St., n'w cor. Verona Pl., three-st'y brownstone front store and tenement, tin roof; cost, $6,000; owner, E. Donnellon, President St., near Henry St.; architect, Robert Dixon; builder, E. L. Donnellon.

Newell St., No. 113, w s, 67′ s Norman Ave., four-st'y frame double tenement, tin roofs; cost, $4,200; owner and builder, L. Antonius, 108 Newel St.; architect, T. Engelhardt; mason, U. Maurer.

Dykeman St., w s, 325′ n Conover St., four-st'y frame double tenement, tin roof; cost, $6,200; owner, D. Ruther, 183 Conover St.; architect, Jno. Smidt.

Conselyea St., No. 82, two-st'y and basement frame dwell.; cost, $3,000; owner, Jacob E. Neilsen, 41 Richardson St.; architect, J. B. Wilson; builders, Jacob Schoch and S. L. Hough.

Seventeenth St., n s, 400′ e Fifth Ave., 4 three-st'y frame tenements, tin roofs; cost, each, $2,500; owner, Ellen F. Hermans, 263 Seventeenth St.; architect, A. B. Bush; carpenter, Geo. Hermans.

Manhattan Ave., No. 525, w s, 50′ n Eagle St., four-st'y frame store and double tenement, felt and gravel roof; cost, $5,300; owner, Mr. May, 83 Oakland Ave.; architect, F. Weber; builders, J. Hafford and Port & Walker.

Hart St., n s, 140′ e Sumner Ave., 6 two-st'y and basement brownstone front dwells., tin roofs; cost, each, $4,500; owner, Thomas J. Moore, 72 Sumner Ave.; architect and builder, John Erickson.

Van Buren St., s s, 250′ e Throop Ave., 13 two-st'y brownstone front dwells.; tin roofs; cost, each, $5,000; owner and builder, Patrick Concannon; architect, I. D. Reynolds.

Alterations. — *Meserole St.*, s s, 75′ w Leonard St., raised one-st'y, front wall rebuilt; cost, $4,000; owner, Jos. Burger, Meserole St., cor. Leonard St.; architect, Jno. Platte.

Twenty-second St., Nos. 130 *to* 136, cellar excavated and walls built; cost, $4,000; owner, John Schlegel; architect, T. Engelhardt.

Chicago.

Apartment-Houses. — J. V. Wadskier is architect for an apartment-house, cor. of State and Superior Sts., for C. B. King, of brick, brownstone and terra-cotta; cost, $40,000.

J. V. Wadskier, architect, has completed plans for flats, to be built on North Wells St., between Oak and Wendell Sts., for Z. Stiles Ely, of New York, of pressed brick, limestone and terra-cotta; cost, $30,000.

Building Permits. — E. Russell, two-st'y dwell., 796 West Monroe St.; cost, $5,000; builders, Wilkie & Holman.

F. Zapel, three-st'y dwell. 861 Clybourne Ave.; cost, $6,000.

Rev. Herrick Johnson, two-st'y dwell., 1082 North Halsted St.; cost, $10,000; architects, Treat & Foltz; builders, Falkner Bros.

Mrs. Ellen Spry, two-st'y dwell., 481 West Monroe St.; cost, $20,000; architects, J. M. Van Osdel & Co.; builders, Clark Bros.

Z. S. Ely, three-st'y flats, 322 to 326 Wells St.; cost, $30,000; architect, J. V. Wadskier; builder, T. Nicholson.

J. E. Waters, three-st'y flats, 147 and 149 West Congress St.; cost, $15,000; architect, J. I. Flanders; builder, Thos. Nicholson.

F. H. O'Connor, two-st'y dwell., 132 and 134 North Market St.; cost, $4,000; architect, J. Zittel; builder, Neals.

G. A. Johnson, three-st'y dwell., 345 Rush St.; cost, $7,000; architects, Burling & Whitehouse; builders, Fagerlund & Wilson.

J. F. Lawrence, three cottages, Colorado Ave., cor. Albany Ave.; cost, $3,000.

Arthur Dixon, 4 three-st'y stores and dwells., State St., near Thirty-fifth St.; cost, $20,000; architect and builder, Arthur Dixon.

G. Schnee, two-st'y dwell., 99 Jay St.; cost, $3,500.

Ames & Frost, four-st'y factory, 215 to 221 Cherry Ave.; cost, $8,000; architect, L. G. Halberg; builder, Thos. Nicholson.

Henry Wedemeyer, 2 three-st'y dwells., 216 and 218 Ohio St.; cost, $10,000; architect, H. Rehwoldt.

Parkhurst & Wilkinson, one-st'y shed, 152 to 156 Kinzie St.; cost, $6,500; architects, Scott & Gage.

D. D. Fanning, four-st'y flats, 329 East Indiana St., cost, $12,000; architect, G. H. Edbrooke; builders, Rogers & Koch.

J. Roff, two-st'y dwell., 3262 Groveland Park; cost, $4,0 0.

Mrs. M. Jaurett, two-st'y dwell., 3252 Groveland Park; cost, $4,000.

E. C. Day, two-st'y dwell., 3250 Groveland Park; cost, $4,000.

D. F. Bacon, two-st'y dwell., 3260 Groveland Park; cost, $5,000; architects and builders, Briggs & Warren.

H. F. White, three cottages, 468 to 472 Idaho St.; cost, $3,600.

H. F. White, three cottages, Oakley St., cor. Emerald Ave. and Summer Sts.; cost, $3,600.

Mrs. H. Keeney, two-st'y dwell., 780 Washtenaw Ave.; cost, $3,000; architect and builder, D. P. Keeney.

F. A. Thomas, two-st'y dwell., 20 Walton Place; cost, $6,060.

M. W. Diffley, two-st'y dwell., 42 Bellevue Pl.; cost, $7,000; architect, J. H. Huber; builders, T. Clark & Son.

Cincinnati.

Houses. — Mr. Geo. W. Rapp has the following new work on the boards: —

For F. Enneking, brick dwell., on Myrtle Ave., Walnut Hills; cost, $6,500.

For same party, brick dwell.; cost, $6,000.

For F. Thauwald, pressed brick dwell., 41′ x 55′, on Gilbert Ave.; cost, $12,000.

New York.

Club-House. — The New York Athletic Club has appointed Mr. C. W. Clinton architect of its new building.

Dwellings. — Five three-st'y frame dwells., 18′ x 30′, are to be built from designs of Mr. H. D. Tiffany, on the e s of Stebbins Ave., between One Hundred and Sixty-fifth St. and Holmes St.

Family Hotel. — Excavation has commenced on the Central Park Plaza property purchased by Pfyfe & Campbell. It is proposed to erect an apartment-house without kitchens, the food to be supplied from the restaurant, so that it will more appropriately be termed a family hotel. The cost of the buildings may reach as high as $1,500,000; Carl Pfeiffer, architect.

Apartment-Houses. — For Mr. Jacob L. Maschke, 10 five-st'y brownstone double flats, 25′ x 80′, are to be built on the n s of Seventy-first St., between First and Second Aves., from designs of Mr. Jno. C. Burne; cost, $150,000.

For Mr. Frank Grube, 2 five-st'y brick and brownstone flats, 25′ x 75′, are to be built on the s s of One Hundred and Sixth St., 100′ e of Fourth Ave.; cost, $28,000; Mr. Andrew Spence, architect.

For Mr. James Moore, plans are being drawn by Mr. Jos. M. Dunn for 2 four-st'y tenements, to be built at Nos. 505 and 507 West Twenty-sixth St.

For Mr. W. H. Schneider, a five-st'y tenement, 25′ 6″ x 75′, is to be built at No. 1428 Avenue A, from designs by Mr. Julius Kastner.

For Mrs. Julia Mullaly, a five-st'y flat house, 25′ x 65′, with extension, is to be built from plans of Mr. C. F. Ridder, Jr.

Building Permits. — *Fiftieth St.*, s s, 128′ 11″ e Eleventh Ave., three-st'y brick factory, gravel roof; cost, $11,000; owner, Rosalie Steinhardt, 239 West Twenty-fourth St.; architect, Geo. B. Pelham.

One Hundred and Thirty-first St., s s, 225′ e Seventh Ave., one-st'y brick and stone church, slate roof; cost, $6,000; owner, Baptist Church of the Redeemer, Wm. J. Coles, President of Board of Trustees, 20 East One Hundred and Twenty-seventh St.; architect, Wm. J. Merritt; builders, John Fullam and R. A. Hollister.

Forty-seventh St., s s, 150′ w Eighth Ave., 2 five-st'y brownstone front flats, tin roofs; cost, each, $22,000; owner, Fred. Schuck, 516 East Eighty-fifth St.; architect, John Brandt.

Park Ave., w s, 67′ n Ninety-first St., 4 three-st'y brownstone front dwells., tin roofs; cost, each, $10,000; owner, Andrew J. Kerwin, 1 Riverview Terrace; architect, A. B. Ogden.

Madison Ave., n e cor. Seventy-first St., two-st'y brick and stone church, slate and copper roof; cost, $100,000; owner, St. James Church, Cornelius B. Smith, pastor, 48 East Seventy-fifth St.; architect, R. H. Robertson; builders, Norcross Bros.

West Forty-sixth St., No. 515, five-st'y brick tenement, tin roof; cost, $9,000; owner, Mrs. Margaret Costello, 532 West Forty-sixth St.; architect, John M. Foster.

West Forty-Sixth St., No. 534, five-st'y brick tenement, tin roof; cost, $9,000; owner and architect, same as last.

One Hundred and Forty-fourth St., s w cor. Brook Ave., four-st'y brick tenement and store, gravel roof; cost, $10,000; owners, John H. Schilling, One Hundred and Forty-sixth St., cor. Third Ave., and Samuel F. Pease, One Hundred and Forty-third St., near Brook Ave.; architect, John Rogers.

Elizabeth St., Nos. 53 *and* 55, seven-st'y brick warehouse, tin roof; owner, Philip Strobel, 25 East One Hundred and Twenty-seventh St.; architect, Albert Wagner.

West Sixteenth St., Nos. 431 *and* 433, 2 five-st'y brick tenements, tin roofs; cost, each, $15,000; owner, Henry G. Monarque, 2147 Third Ave.

One Hundred and Sixth St., s s, 120′ e Fourth Ave., three-st'y brick and stone coach-house and dwell.; cost, $14,000; owner, Daniel Shefflin, 2056 Second Ave.

West Forty-ninth St., Nos. 405 *and* 407, 2 five-st'y brick tenements, tin or gravel roofs; cost, each, $9,000; owner, D. W. Slocum, 219 Hooper St., Brooklyn; architect, Robert Mook.

Ninety-first St., n w cor. Park Ave., 5 three-st'y and basement brownstone front dwells., tin roofs; cost, each, $12,000; owner, Andrew J. Kerwin, 1 Riverview Terrace; architect, A. B. Ogden, 409 East Fifty-third St.

Eighty-first St., n s, 97′ 4″ w Park Ave., 2 four-st'y brownstone front dwells., tin roofs; cost, each, $15,000; owner and architect, same as last.

East Forty-fifth St., No. 232, five-st'y brownstone front tenement, tin roof; cost, $17,000; owners, Jas. Kyle & Sons, 137 East Fortieth St.; architect, Jas. Kyle.

Fifty-seventh St., s e cor. Tenth Ave., five-st'y brownstone front flat and store, tin roof; cost, $40,000; owner and builder, Wm. Rankin, 338 West Forty-seventh St.; architects, Thom & Wilson.

Fifty-seventh St., s s, 27′ e Tenth Ave., 2 five-st'y brownstone front flats, tin roofs; cost, each, $32,000; owner, builder and architects, same as last.

Fifty-seventh St., s s, 81′ e Tenth Ave., five-st'y brownstone front flat, tin roof; cost, $20,000; owner, builder and architects, same as last.

Thirty-seventh St., s s, 325′ e Eleventh Ave., five-st'y brick packing-house and refinery, gravel roof; cost, $17,000; owners, Rohe & Brother, 254 and 256 West Thirty-third St.; architects, Thom & Wilson.

ALTERATIONS.—*Madison Ave.*, *No.* 678; cost, $3,000; owner, Mrs. Augustus Brown, on premises; architects, Kimball & Wisedell; builders, Elice & Ketson.

West Twenty-second St., *Nos.* 508, 510, 512 *and* 514, one-st'y brick extension and internal alteration; cost, $3,150; lessees, Am. Metre Co., Wm. H. Down, Secretary, 512 West Twenty-second St.; architects, D. & J. Jardine.

William St., *No.* 35, new entrance and internal alterations; cost, $3,000; owner, Bank of the State of New York, on premises; architect, O. V. Hatfield; builders, Robinson & Wallace, and Haight & Hanlon.

Philadelphia.

MARKET-HOUSE AND HALL.—At Third St., cor. Norris St., market-house and hall, of brick, 77′ x 236′, is being built for J. L. Shoemaker, Esq., from plans by Willis G. Hale, architect.

CEMETERY LODGE.—Entrance to the Mechanics' Cemetery, cor. Twenty-second and Diamond Sts., consisting of lodge, gateway, and chapel; lodge, 28′ x 48′; chapel, 20′ x 30′; cost of the entrance, $10,000; from plans by Willis G. Hale, architect.

BUILDING PERMITS.—*Woodland Ave.*, w of Seventy-first St., two-st'y store and dwell., 21′ x 53′; Wm. Clarg, Jr.

Sutherland Ave., *No.* 800, two-st'y stable, 32′ x 90′; C. D. Rees' Sons & Co.

Eighteenth St., n of Catharine St., one-st'y factory, 40′ x 60′; Rosengarten & Sons, owners.

Lex St., s of Seneca St., two-st'y dwells., 15′ x 30′; W. D. Haines, contractor.

Mulberry St., cor. Branner's Ave. three-st'y store and dwell., 24′ x 24′; Geo. F. Payne & Co., contractors.

Paschall Ave., w of Seventy-first St., 4 two-st'y dwells., 14′ x 42′; Geo. S. Patchell, contractor.

Tacony St, and Trenton R. R., two-st'y addition to storehouse; Ellis S. Lewis, contractor.

Eighth St., cor. Mifflin St., 4 two-st'y dwells., 16′ x 40′; J. Stukey, owner.

Kates St., e of Broad St., two-st'y brewery, 16′ x 45′; Jno. Welde.

Shamokin St., between Twenty-second and Twenty-third St., boiler-house, 28′ x 45′; Jas. H. Howard, contractor.

Cedar St., n of Meadow St., one-st'y factory, 30′ x 60′; E. K. Welch, contractor.

Wyoming Ave., cor. Fisher's Lane, two-st'y back building, 30′ x 32′; E. K. Welch, contractor.

North Nineteenth St., *No.* 809, three-st'y addition to factory, 40′ x 50′; Catherwood Robinson, owner.

Otsego St., *No.* 1722, two-st'y dwell., 15′ x 28′; and two-st'y stable, 15′ x 26′; Jackson Hook, contractor.

Walnut Lane, cor. Wayne Ave., two-st'y stable, 35′ x 75′; Townsend Bros., contractors.

Watt St., n of Federal St., two-st'y dwell., 16′ x 40′; Howard May, owner.

Broad St., n of Jefferson St., 2 four-st'y dwells., 20′ x 76′ and 29′ x 96′; H. G. Freeman, owner.

Market St., w of Front St., four-st'y warehouse, 70′ x 125′; A. B. Rocke, contractor.

North Third St., *No.* 28, three-st'y addition to store, 30′ x 52′; E. Thompson, contractor.

Manayunk Ave., cor. Cedar St., three-st'y dwell., 19′ x 50′; McIlvain & Cunningham.

Sixth St., n of Dauphin St., addition to stable, 20′ x 124′; Jas. Hood, contractor.

Gray's Ave., cor. Seventy-second St., two-st'y dwell., 28′ x 38′; Robert Alexander, owner.

Edward St., w of Hancock St., three-st'y stable, 40′ x 72′; J. B. Doyle, contractor.

Smick St., cor. Jefferson St., three-st'y store and dwell., 20′ x 51′; E. R. Leigh, owner.

Front St., n of Master St., three-st'y dwells., 17′ x 48′; Shegog & Quigley, contractors.

Sixth St., s of Berks St., three-st'y dwell., 18′ x 45′, and two-st'y stable, 28′ x 50′; J. C. Haldeman, contractor.

Shumach St., between Manayunk St. and Ridge Ave., two-st'y dwell., 24′ x 64′, and two-st'y stable, 18′ x 40′; Jas. A. Davis, owner.

Penn St., s of Ashland St., 2 two-st'y dwells., 16′ x 27′; P. O'Keefe, owner.

St. Louis.

BUILDING PERMITS.—Fifty-nine permits have been issued since our last report, eighteen of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows:—

Martin Johanson, two-st'y brick dwell.; cost, $3,000; J. B. Legg, architect; Samuel Lonquist, contractor.

S. Watson, two-st'y brick dwell.; cost, $3,000; J. Stewart & Co., architects; S. Watson, contractor.

Brinkwirth & Nolker Brewing Co., four-st'y brick ice-house; cost, $10,000; E. Jungenfeld, architect; contract sub-let.

A. A. Condon, two-st'y brick dwell.; cost, $4,000; F. Weston, architect; E. T. Hoffman, contractor.

Zelle Bros., two-st'y brick dwell.; cost, $3,400; Beinke, architect: Hy. Wanschaffe, contractor.

Zelle Bros., two-st'y brick dwell.; cost, $3,400; Beinke, architect; Hy. Wanschaffe, contractor.

St. Paul, Minn.

HOUSES.—Dr. Sutherland is building, on North Tenth Ave., a block of four houses; cost, $3,000.

J. A. Tyler is to build a $2,500 house on Western Ave., near Seventh St.

ENGINE-HOUSE.—Work has commenced on the new engine and hose house, cor. of Franklin Ave., between Twenty-first and Twenty-second Sts.

STORES.—Robinson & Bartleson have commenced a frame store on North Washington Ave., above Fourth Ave.; cost, $1,500.

Herman Dean is adding another store to his block on Plymouth Ave., between Fourth and Fifth Sts.

STABLE.—Robert Brandon is erecting a large livery-stable on Plymouth Ave., between Fourth and Fifth Sts.

General Notes.

CUMBERLAND ISLAND, GA.—Ground has been broken for the granite mansion for Mrs. Lucy Carnegie, of Pittsburgh, Pa., on the site of the historic ruins of Dungeness, on Cumberland Island, Ga., the former residence of General Nathaniel Greene, of Revolutionary fame.

KANSAS CITY, MO.—For P. E. Emery, Esq., of Flemington, N. J., three dwells., brick, tile and stone finish, 20′ x 60′; cost, $18,000; plans by Willis G. Hale, architect, Philadelphia, Pa.

NEWPORT, R. I.—It is now understood that the Committee of the City Council on the selection of a site for a new asylum have decided upon recommending the Newton lot, off Broadway.

Mr. G. G. Haven, of New York, is to build a cottage on Bellevue Ave.

Mr. James Wilcox, of Philadelphia, will build a cottage on Conanicut Island; as also Dr. W. V. Keating of the same city.

NEW ORLEANS, LA.—Director General Burke, of the World's Industrial Cotton Centennial Exposition, has invited designs for the main building, to embrace one million square feet of floor space, and cost $250,000. Premiums are offered of $1,000 for the best plan, $500 for the second, and $250 for the third. Plans are receivable to noon, November 25!!

PAWTUCKET, R. I.—Subscriptions are being collected for a new church for the Park Place Society.

SOUTH ORANGE, N. J.—The corner-stone of the Alumni Hall of Seton Hall College was laid October 25. The building will be a Gothic structure, of undressed brownstone, 45′ x 75′, and will consist of two stories. The building, when completed, will cost about $13,000.

Bids and Contracts.

BOSTON, MASS.—The following is a synopsis of the bids for marble wainscoting, etc., for the post-office and sub-treasury:—

C. E. Hall & Co., $5,345.
E. Fritsch, $4,813; K. W., $6,574.40 and $6,268.40.
Davidson & Sons, $5,887.17.
Bowker, Torrey & Co., $10,365.
A. Wentworth Roberts, $2,554, for marble mantels only.

The following is an abstract of the bids for marble and encaustic tiles:—

Thomas Aspinwall, encaustic tiles, $1,281.
American Encaustic Tiling Company, encaustic tiles, $700.
Davidson & Sons, encaustic tiles, $960.75.
C. E. Hall & Co., encaustic tiles, $1,065.
Davidson & Sons, marble tiles, $4,500 and $5,095.24.
C. E. Hall & Co., marble tiles, $6,817, $6,000, and $5,600.
Bowker, Torrey & Co., marble tiles, $6,679.
George & R. L. Barney, marble tiles, $6,200.

CHARLESTOWN, W. VA.—The following is a synopsis of bids for iron fences, gates, etc., for the approaches for the post-office, court-house, etc.:—

Champion Iron Fence Company, $1,049.50 (*accepted*).
Burnet & Co., $1,062.
Henry A. Vanderbeck, $1,100.
Merz Architectural Iron Works, $1,175.
George White & Co., $1,334.
J. P. Walton & Co., $1,373.
Joseph Hall & Co., $1,430.
M. J. O'Brien, $1,641.99.
Charles Ward, $1,250.

CHICAGO, ILL.—The contract for fire-proofing the new Board of Trade Building has been awarded to the Wight Fire-proofing Co., of this city, at $44,000.

PITTSBURGH, PA.—The following is a synopsis of the bids for cut-stone for the superstructure of the court-house and post-office:—

Jacob Veihmeyer, granite, $255,000; lime, $194,000 and $213,000.
Virginia State Granite Co., granite, $217,386.
M. A. M. McGowan, Berea, $90,200.62; lime, $99,905.75; granite, $214,083.75.
Syenite Granite Company, granite, $249,786.
Gile & McMahone, granite, $192,330.
Sweet & Davis, granite, $223,369.
Davis & Tilson, granite, $207,000.
W. D. Collingwood, Ohio blue, $103,700; buff, $103,700; Berlin, $109,800.
Bedford Limestone Company, lime, $117,259.85.
Cape Ann Granite Company, granite, $228,851.25.
Bodwell Granite Company, granite, $117,721.
Mount Waldo Granite Company, granite, $239,850.

PROPOSALS.

FOUNTAIN.

[At Jersey City, N. J.]

OFFICE OF CUSTODIAN POST-OFFICE, ETC.,
JERSEY CITY, N. J., November 5, 1883.

Sealed proposals will be received at this office **until 12 M., on the 19th day of November, 1883**, for furnishing the material and building complete the fountain required in the improvement of the grounds of this building, in accordance with drawing and specification.

Copy of the specification and any additional information may be had on application at this office, where the drawing may be seen.

J. G. GOPSILL,
Custodian.

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STONE AND BRICK WORK.

[At Peoria, Ill.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., November 7, 1883.

Sealed proposals will be received at this office **until 12 M., on the 28th day of November, 1883**, for furnishing the labor and material, stone, bricks, mortar, etc., and building complete, the basement and area walls of post-office, court-house, etc., at Peoria, Ill., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

JAS. G. HILL,
Supervising Architect.

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FURNITURE.

[At Paducah, Ky., Topeka, Kan., Charleston, S. C.]

OFFICE OF THE SECRETARY,
TREASURY DEPARTMENT,
WASHINGTON, D. C., October 31, 1883.

Sealed proposals will be received at this office **until two o'clock, P. M., of Monday, November 19, 1883**, for manufacturing, delivering and placing in position, in complete working order, certain furniture for the United States court-house and post-office buildings, at Paducah, Ky., and Topeka, Kan., and the United States custom-house building at Charleston, S. C.

Upon application to this office, detailed information will be furnished to furniture manufacturers desiring to submit proposals.

The Department reserves the right to reject any or all bids or parts of any bid, and to waive defects.

412 CHAS. J. FOLGER, Secretary.

GAS-FIXTURES.

[At Charleston, W. Va., and Topeka, Kan.]

OFFICE OF THE SECRETARY,
TREASURY DEPARTMENT,
WASHINGTON, D. C., November 5, 1883.

Sealed proposals will be received at this office **until 2 o'clock, P. M., of Monday, November 26, 1883**, for manufacturing, delivering, and placing in position in complete working order, certain gas-fixtures for the United States court-house and post-office buildings at Charleston, W. Va., and Topeka, Kan.

Upon application to this office, detailed information will be furnished to all manufacturers desiring to submit proposals.

The Department reserves the right to reject any or all bids or parts of any bid, and to waive defects.

H. Q. FRENCH,
Acting Secretary.

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

A SERIOUS accident occurred last week at Madison, Wisconsin, where the roof and south wall of a wing now being added to the State Capitol fell in without warning, burying nearly thirty men in the ruins. Four of the men were killed instantly, and about eighteen more were fatally, or very seriously injured. No reasonable clue is given in the published accounts to the cause of the collapse, but there seems to be some ground for supposing that the roof failed first, since one of the men who was brought out of the ruins unhurt explained his escape by saying that while at his work, in the basement of the structure, he happened to look up through the hatchway through which materials were hoisted to the roof, and as he did so, seeing the roof move, he leaped under the hoisting-machine, just in time to avoid the shower of timbers and bricks which buried the men working beside him. The contractors for the building profess, probably with sincerity, complete ignorance of the cause of the catastrophe, and an investigation is to be held under the direction of the State authorities, who can, if they really wish, easily discover the origin of an event which, it is safe to say, would not have occurred without an adequate cause.

A LARGE frame building in Buffalo, New York, fell a few days after the catastrophe at Madison, with consequences nearly as fatal, four men being killed outright, and seven others badly hurt. According to some of the daily papers, the structure "collapsed like a balloon," or, as others say, "the supports all gave way at once;" just as if spruce timbers, properly proportioned to their work, were liable to unaccountable attacks of temporary weakness; but a glimpse of an explanation is to be found in a remark that the frame was not braced, although the roof had been put on. With ordinary balloon frames of the cheapest kind, although bracing is dispensed with, the studs are usually boarded in, so as to form a box, before the rafters are set in place; but it is conceivable that a reckless builder might put a bulky roof on top of the unbraced and bare studding, and in such a case nothing more than a high wind would be needed to lay the whole flat on the ground.

A PIECE of unjustifiable carelessness nearly caused the death of two men in Philadelphia a few days ago. Several workmen were employed in taking down the front of a building in the older part of the city, and in removing the wall, instead of lowering the bricks on the outside as fast as they were dislodged, piled them upon the floor behind them. As Philadelphia bricks weigh about five pounds apiece, it did not take long to accumulate a weight of some tons on the middle of the frail beams, which, after supporting it as long as they could, at last gave way, precipitating the whole mass, and the men with it, from the third story to the basement. Fortunately, although two of the men were slightly hurt, no one suffered seriously, and the effect of the crash will be, we hope, only to warn others against similar thoughtlessness. It is by no means uncommon to see masons load the staging planks beside them, or rather, permit their helpers to load them, to the very verge of their strength; and every few weeks even this limit is passed, and one or two victims are sacrificed as a lesson to their fellows.

ANOTHER case in which the New York elevated railways are concerned was decided a few days ago in that city. A certain lawyer bought not long ago an estate on the southeast corner of Greenwich and Rector Streets, by which the elevated tracks run, and in a few weeks after making his purchase brought a suit to restrain by injunction the operation of the road in front of his property. In petitioning for the aid of the court the plaintiff represented that so far as Rector Street was concerned, the fee of the land had never passed to the city, and as no proceedings had been taken by the railroad company to ascertain the real ownership of the land, its occupation of the street was unauthorized, and injurious to his rights, while Greenwich Street. although city property, was so obstructed by the elevated tracks as to have lost a part of its character as a public street, to the further detriment of the rights and privileges belonging to him as owner of the abutting estate. The council for the defendant corporations answered that as the plaintiff was not the owner of the premises at the time when the road was built, and the damages, if any, were sustained, he was not entitled to recover compensation, and, moreover, that as the present corporations only operated the road which was built by another company, they were not liable for the deeds of their predecessors.

THIS plea was at once set aside by the judge, on the ground that the plaintiff did not ask for compensation for the building of the road, but for relief from the injury caused him by the running of trains over it, and reimbursement of the loss which he had sustained in this way since he became the proprietor of the estate. There could be no doubt that an action of this kind could be maintained, and the question was whether the plaintiff actually possessed such rights in the streets bordering on his premises as would entitle him to prevent their use by the railroad companies. This question had been decided by the State Court of Appeals in the case of Story against the New York Elevated Railroad Company, in which it was held that the operation of such a railway to a certain extent impeded the ordinary use of the street, and obstructed light and air, and so far abridged the privileges of abutting owners which were involved in the maintenance of the street as a public way. The fee of Greenwich Street was conveyed to the city in 1761, on the condition that the property conveyed should be held by the city as a public street forever; and the city accepted the conveyance subject to this condition, which, in the opinion of the judge, gave the owners of the adjoining property the right to have the street forever kept open, or to receive compensation for the damage which they might suffer by reason of obstructions placed in it without their consent. It would be within the province of the court to estimate the value of the plaintiff's rights in the street, and to provide in the judgment that if the defendants should pay to the plaintiff the sum so assessed, the injunction asked for by the plaintiff should be denied; but as in the opinion of the judge this would be a favor to the defendants, for which they had not asked, he concluded simply to order judgment for the plaintiff, that, as he requested, the defendants should be enjoined and restrained from further use of his property in Greenwich and Rector Streets, and should pay him damages for their previous use of it at the rate of five hundred dollars a year from the time the plaintiff became owner of the property until the entry of the judgment. In order, however, to avoid needless annoyance to the railroad companies and the public, it was further directed that the injunction should not issue for six months, so as to give the defendants time to acquire the plaintiff's property, or in some way to come to an agreement with him.

A SUIT, somewhat similar in its character to the Elevated Railroad cases, has been brought against the great East River suspension bridge, or rather, against the Mayor, Aldermen, and Commonalty of the cities of New York and Brooklyn, which own the bridge, to recover compensation for the damage caused by it to the business of a certain warehouse man of Brooklyn, who finds that the larger class of ships is prevented from reaching his warehouses, and desires to have it enjoined and abolished as an unlawful nuisance. It is well

known that very large ships cannot pass under the Brooklyn bridge without sending down the upper portion of their masts, and according to the counsel for the plaintiff, about two-fifths of the tonnage entering the port of New York is thus prevented from going above the bridge. That this constitutes an obstruction to navigation sufficiently serious to demand recognition from the courts seems obvious enough, and a decision of the Supreme Court of the United States, which declared a certain bridge over the Ohio River to be such an obstruction, although only seven steamboats out of the two hundred and thirty on the river had smoke-stacks high enough to touch it, certainly confirms this position; but the plaintiff's representations as to the amount of the injury done him appear to have lost a good deal of their force by reason of the circumstance that the main cables of the bridge were put in place several years ago, without any opposition or remonstrance from him, and that, furthermore, although the obstruction remained unchanged during the long period devoted to the completion of the bridge and its approaches, no notice was taken of it until many millions of dollars had been spent upon it, and it was thrown open to public use.

THE Cape Cod Ship-Canal Company has been passing through a trying experience, and it is quite possible that the sufferings which it has undergone may have so reduced its strength that it will succumb to them, and expire quietly, without an attempt to rally. After a series of ostensible attempts at surveying a canal across the Massachusetts promontory, which were, as it is said, merely pretences, devised as a cover for attacks upon the pockets of credulous investors, a new company applied for and obtained a charter last year, under restrictions which were intended by their severity to exclude speculators. Among other things the company was obliged to deposit two hundred and fifty thousand dollars with the State treasurer as a guaranty of its intention to carry on the work to completion; and a proviso was added, that unless twenty-five thousand dollars should have been actually expended upon the canal work before the twenty-sixth day of October, in addition to the deposit of the guaranty fund, the charter should expire on that day. The new company was very slow in getting its affairs arranged, and although the guaranty money was duly deposited, and on the appointed day in October more than four hundred and fifty men were at work on the excavation, there appeared to be some question as to whether the requisite twenty-five thousand dollars' worth of work had been done, and the enemies of the enterprise, of whom the chief is of course the railroad company whose line is intercepted by the canal, promptly challenged the validity of the charter.

THE investigation following, which took place before the Railroad Commissioners, revealed some rather unpleasant traits of human nature. As the forfeiture of the charter was an object much desired by certain persons, a party of experts was sent to the scene of operations on the day fixed for the decision, and the amount of excavation measured, the materials on hand noted, and estimates privately made on which to base a challenge of the charter. The testimony gathered in this way by the experts does not seem, on comparison of their results, to cast much credit on their powers of computation. One of them, who took the trouble to apply a tape-line to the excavation, came to the conclusion that about sixty-three or sixty-four thousand cubic yards of material had been taken out, and that the value of this work, together with that of piles driven and timber on the ground, would amount to something like sixteen thousand dollars. The other, who appears to have measured by his "eye," instead of the more troublesome, but more accurate tape, "judged" that about ten thousand yards of excavation had been done, and concluded that the total cost of the operations should be fairly estimated at about four thousand dollars.

THIS discrepancy, amounting to three hundred per cent, between the valuations of two experts, sent to the spot on the same duty, and in the interest of the same parties, seems to have invited further inquiry, and on pressing the point a little, certain papers were produced, and identified by the second expert as having been written by him, in one of which, sent from the scene of the canal operations, on the evening of the day on which his investigation took place, to the engineer of the Canal Company, he informed the engineer that he "was in possession of the necessary facts, figures and measurements" needed to make up the estimate of the expenditure incurred by the company. "These," he was kind enough to say to his correspondent, he "would hold till he heard from him," requesting him, however, to reply within three days. In order to facilitate the process of arriving at a satisfactory private understanding with the engineer, he was also good enough to draw up an explicit proposition, ready for immediate acceptance, under which he was to be associated with the contractor already entrusted with the work, and a new contract made with the firm for all the excavation, at forty cents per cubic yard, or about twice the proper price; and in return for this favor he promised to "assist," probably out of the wealth of information gathered by the use of his "eye," "in showing the amount expended to date for the purpose of saving the charter." This alluring offer does not seem to have been warmly received by the engineer of the company, and the elastic expert was obliged to carry his valuable testimony to the opposing party.

THE *Fireman's Journal* gives a table, prepared with considerable labor, showing the number of towns in each State, containing more than fifteen hundred inhabitants, which are provided with apparatus for extinguishing fires, and, to compare with this, the number of towns of similar population which are destitute of such protection. As might be supposed, the table shows that the Southern towns are much less generally furnished with fire-engines than those of the North, but this is sufficiently explained, perhaps, by the large territory and scattered population of most places in the South. The most instructive comparison is that between the Eastern and Western portions of the country north of Mason and Dixon's line, and this indicates that the citizens of the new towns of the far West are much more energetic in adopting measures for protecting their property than their Eastern brethren. As an illustration of this, the States and Territories of Nevada, Oregon, Dakota, Idaho, Montana and Washington contain twenty-nine towns of more than fifteen hundred inhabitants, and of these every one has its fire-department, with apparatus for use; while in Massachusetts, out of two hundred and sixty-one similar towns, only one hundred and sixty-four, or about three-fifths, are so provided, and in Pennsylvania and Connecticut the proportion is even less. These are the worst of the Northern States, the ratio of protected towns rising in New York to about two-thirds of the whole number, in New Jersey, Wisconsin and Michigan, to about three-fourths, and in Minnesota, Nebraska, New Hampshire and Ohio to four-fifths or more. The Dominion of Canada, which we are disposed to consider a place of rather primitive manners, is far in advance of us in this respect, the whole Dominion, out of one hundred and sixteen towns of fifteen hundred inhabitants, having but one without a fire-department.

IT is rather difficult, in the midst of so much conflicting testimony, to learn the exact truth about the timber supply of the United States. Not long ago a report, written, we believe, by a Canadian official, announced that at the present rate of consumption the pine lumber of the United States would be exhausted in something more than seven years. As a similar report published last year by a United States official set the limit at eleven years, it would appear either that one of the writers made a mistake of three years, or that a new and extensive demand for the timber had recently sprung up; but a third report, or rather an address, just delivered before the American Forestry Congress at St. Paul, Minnesota, by Dr. George B. Loring, United States Commissioner of Agriculture, indicates that there must have been something wrong about the estimates of both the official gentlemen who prophesied before him. According to Dr. Loring, the danger that the timber product of the United States will be exhausted is much more remote than the speculating holders of forest land would have us believe. Not only, as he says, is the planting of pine trees, and the production of lumber, rapidly increasing in the Eastern States, but even in the forest States of the Northwest so much attention is now paid to replanting the cleared districts that, notwithstanding the enormous consumption, the acreage of woodland steadily increases, and twenty-five years hence the new crop of cultivated forest trees will be, he thinks, more valuable than the original growth. In other States, which were at the time of their settlement by the whites nearly destitute of woodland, great progress has been made in tree-cultivation, and in Minnesota alone nearly forty thousand acres were planted with forest trees last year; while even in Nebraska there are now more than one hundred and seven thousand acres of cultivated forest.

STRAINS IN FRAMED STRUCTURES.[1]

PROFESSOR Du Bois is one of the earlier American workers in the science of graphical statics, a knowledge of which was largely imparted to American architects and engineers by his "*Graphical Statics.*" He now publishes a larger work, having the same objective application, and intended to fully explain the principal methods in use for obtaining the strains in bridge and roof trusses; to compare these methods, showing their relative practical value; to elucidate the proper modes of application to the different type forms of trusses, and to furnish practical information concerning the best methods of computing the sectional dimensions of members required to resist these strains, as well as to explain the usual modes of connecting these members at the joints.

The author appears to be one of the first American writers to appreciate the fact that the following are at least of equal importance.

1. Finding maximum strains in truss members.
2. Determination of sectional dimensions of members, with due regard to economy of material and labor.
3. Arranging the joints or connections so as to obtain maximum strength at least cost.

Most writers stop with the first, coolly telling the student that they will teach him the theory, and that he must get a position in a bridge-works to get the practical knowledge he wants, and to learn how to use the theory. But bridge-building establishments are not educational or philanthropical institutions, and are not likely to employ raw graduates, filled with theories, so long as men possessing a practical knowledge of the subject can be obtained.

The volume, which is a goodly quarto containing nearly 400 pages, illustrated by nearly 300 engravings, besides several folded plates representing the actual working-drawings of a bridge, and is neatly and strongly bound, is divided into two parts, theoretical and practical. An introduction contains the necessary definitions, as well as a statement of the principles of equilibrium of forces and moments on which all methods of obtaining strains in trusses are necessarily based.

Four modes of procedure are given, stated to comprise all that are in use.

1. Resolution of forces; graphical; analytical.
2. Method of moments; analytical; graphical.

A series of axioms or postulates, relating to the manner in which strains act in the members, calls the attention of the reader to some points which are quite essential, though usually omitted. The signs adopted by the author to indicate compression and tension are the reverse of those used by Ritter, Burr, and Landsberg. This change makes no material difference and possesses no evident advantage.

Bow's system of notation is used, though less simple than the one employed by Professor Du Bois in his "*Graphical Statics,*" Plate II of Appendix, in which the space above the truss is termed X, that below it Y. The system would be further improved by numbering the triangles of the truss in order, instead of lettering them.

The graphic method by resolution of forces is practically identical with the English method of reciprocals, though less fully developed than in Clarke's "*Principles of Graphic Statics.*"

The check on its accuracy by symmetry of the strain diagram, fails when either truss diagram or the loading is unsymmetrical. A better check is to commence the strain diagram at each end of load line, working toward the centre of truss from each end. If the work is correct, the line joining the two portions of the strain diagram will be parallel to the corresponding line of the truss diagram.

The method of analytical resolution of forces is sometimes termed trigonometrical, because the formulæ contain functions of the angle of inclination of the piece from a vertical. It is merely the analytical expression of the graphical method, being based on the same law of equilibrium of forces at an apex. The application clearly demonstrates the great inferiority of this method to the graphical for obtaining strains in roof-trusses, requiring much more labor and involving greater liability to errors, which are less easily detected. The inclinations of the members can be measured from the truss diagram with accuracy sufficient for practical purposes.

The analytical method of moments is that widely known as Ritter's Method of Static Moments, and a very full development of the system with numerous applications to nearly all forms of framed structures, may be found in Ritter's "*Iron Roofs and Bridges*" (English translation by H. R. Sankey, 1879). The limiting condition of its applicability, that not more than three pieces be cut by any section, in which the strains are really unknown, corresponds to that of the first method, that not more than two unknown strains can be found by means of the force polygon for any apex.

The term "sign" is here misapplied to the lever arm of a strain; it properly indicates the direction of rotation produced by the moment considered.

The rule on page 27, for determining the nature of the strain acting on a piece, is not clearly expressed and would certainly perplex the student at first. The author evidently considers the truss as lying in a horizontal plane, with the observer standing on the end of the cut piece considered. If the truss be erected in place and be in a vertical plane, the axis of the observer would then be horizontal and at right angles to the plane of the truss.

The nature of this strain may also be found by assuming that the strain acting in the cut piece considered, and producing equilibrium in left-hand part of truss, always acts from right towards left side of the line of section. Then write out equation of equilibrium of moments for the piece, prefixing to each moment its proper sign of plus or minus, according as it tends to produce positive or negative rotation. Reduce this equation to its simplest form, having symbol of required strain on left-hand side, with plus sign; its amount will be found on right side, preceded by the sign correctly indicating whether the strain be compression or tension.

The time required for application of this method to a given truss can be greatly reduced by measuring the required lengths of lever arms on a correct truss diagram, instead of finding them by calculation; also, by performing the necessary computations for simplifying the equations of moments with a good slide-rule, or four-place logarithms.

The graphic method of moments is merely an application of Culmann's principle. The bending moments and shears acting at any point of the length of the truss are found graphically, and the actual strains in chords and web members are found from these by simple computations.

The application of the four methods conclusively proves that the first graphical method is best adapted to obtain the strains in a roof-truss, because requiring a very small amount of computation, besides being controlled by a system of checks on its accuracy. Ritter's method of moments is next best, especially if lengths of lever arms are measured on a truss diagram. These two methods are perfectly general, being applicable to all forms of trusses and modes of loading, even by inclined forces. The other methods are sometimes of great value in obtaining strains in members of bridge-trusses, especially when the chords are parallel.

In Chapter I of Section II the general subject of roof-trusses is considered. No explanations are here given of the proper method of estimating the loads on a roof-truss, a very essential point. Two formulæ are provided for finding the wind-pressure normal to the roof-surface, with a table computed from Hutton's formula, for angles of inclination varying by differences of five degrees, but without suggesting any method of interpolation for intermediate angles. Hutton's formula is empirical, deduced from experiments made in 1786, 1787 and 1788, with a whirling-machine.[2]

This formula is evidently incorrect, yet is the one most commonly employed by English and American constructors, merely because this subject has been neglected by scientists until very recently.

A second formula is proposed for the same purpose, but the discrepancies between the two are certainly very remarkable. Assuming that the maximum wind-pressure on a plane surface perpendicular to its direction is 50 pounds per square foot, and performing the necessary computations, we obtain the following results.

Angle of inclination: degrees,	5	10	15	20	25	30	85	40
Hutton's formula: nor. press. lbs.,	6.5	12.1	17.5	22.9	28.1	33.1	87.6	41.7
Second formula: nor. press. lbs.,	.4	1.5	3.4	5.9	8.9	12.5	16.5	20.7
Degrees,	45	50	55	60	65	70	80	90
Nor. press. lbs.,	45.1	47.6	49.5	50.0	50.7	51.5	50.5	50.0
Nor. press. lbs.,	25.0	29.4	33.6	37.5	41.1	44.2	48.5	50.0

No mention is here made of the proper amount to be allowed for the weight of snow, though two authorities are quoted on page 263, as recommending 12 and 30 pounds per square foot. Nor is anything said of the manner in which this snow-load per square foot is affected by varying the angle of inclination of the roof. It is plainly evident that the actual maximum snow-load would also vary with the latitude of the locality, being greatest in the Northern States, a moderate amount in the Middle States, while it should be entirely omitted in the Southernmost States. Data could be obtained from the Signal Service Bureau, on which to base an approximate formula for the proper amount of snow-load, varying with latitude.

The author assumes that the maximum wind-pressure may act on a roof at the same time that it supports a maximum snow-load; but it is scarcely possible for snow to remain on the windward side of a roof, exposed to the action of a hurricane having a velocity of over 140 miles per hour, according to the author's formula. This assumption involves an excess of material in principals and tie-beams that would hardly be tolerated in bridge-building. If the maximum weight of snow were to remain on the leeward side of the roof, as assumed by the author, its weight would partly counterbalance the action of the wind, lessening the distortion of the truss, and the

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[1] *The Strains in Framed Structures*, with numerous practical applications to Cranes; Bridge, Roof and Suspension Trusses; Braced Arches; Pivot and Draw Spans; Continuous Girders, etc. Also, Determination of Dimensions and Designing of Details; Specifications and Contracts; Complete Designs and Working-Drawings. By A. Jay Du Bois, C. E., Ph. D. John Wiley & Sons, New York: 1883. Price $10.

[2] *Hutton's Tracts on Math. and Phil. Subjects.* Vol. III, London:

strains in the diagonals and verticals would actually be less than if the snow were omitted.

Our author directs the reactions at ends of truss to be found by calculation, ignoring the beautiful application of the equilibrium polygon, discovered by Major J. R. Willett, of Chicago, applicable to any truss and any mode of loading. (*American Architect*, Vol. III, pp. 30, 41, 55.)

Two cases are considered.

1. Truss anchored at ends to each wall.
2. Truss having expansion-rollers under one end.

It is evident that the entire vertical component of the reaction at either end must be supplied at that end alone, by the upward pressure or assistance of the wall. Consequently, only its horizontal component is capable of transmission through the truss to the other wall. In case of a large church with high walls, not stiffened by transverse partitions, and exposed to the action of the wind, this pressure would act on the wall as well as the roof. Even if the truss were anchored to each wall, if the overturning moment of the wind-pressure on the wall just equals the moment of stability of the wall, the horizontal component of the reaction at windward end of the truss must be entirely resisted by the leeward wall, just as if rollers were placed under the windward end of the truss. For simplicity, the frictional stability of the wall is neglected, as well as the stiffening caused by the rafters and boarding of the roof. If the wind-pressure on the wall be now increased, it appears that one-half the total additional pressure on one bay of the wall would also be transmitted through the truss to the leeward wall. This increase of pressure might be supposed to continue until the total overturning moment of the wind equalled the moments of stability of both walls, when the building would be on the point of falling.

Hence, it becomes evident that the two cases considered are not always sufficient, and that the wrought-iron tie-rod of a truss might even be subjected to compression, causing the collapse of the truss and fall of the roof, when apparently safe.

Some plates of truss and strain diagrams, copied from Bow's "*Economics of Construction*," are then added without explanation.

Nothing is said of the mode of dimensioning the members of roof-trusses, other than the system afterwards given for bridge-trusses, nor are there any descriptions or illustrations of the joints of roof-trusses, which are usually quite different from those of bridge-trusses.

To architects, the chapter on roof-trusses would be the most interesting and useful portion of the book, were not the mode of treatment employed so defective and incomplete. It may be possible, but it is not very probable, that a student could learn to correctly design and detail roof-trusses from the data and explanations to be found in this work. Professor Greene's little book "*Roof-Trusses*" is a much better presentation of the subject, though limited to the use of a single method.

The subject of bridge-trusses is next considered, with the usual explanations, and a discussion of the modes of distribution of the load, which produce maximum strains in the upper and lower chords, and in the web members.

Chapters IV and V are devoted to a consideration of the principal type forms of bridge-trusses, with applications of one of the four methods, Ritter's method being principally employed. Some types are new to works of this kind. The Fink truss differs from those given by Trautwine, Wood and Shreve in having alternate verticals only half as long as the intermediate ones. In the truncated bowstring truss, the panel lengths are sometimes diminished from the middle towards both ends, as in the Randolph Street bridge, at Chicago.

The author arranges the principal types in the following order, from best to poorest: Pratt, Post, Kellogg, Baltimore Bridge Co., Fink, Bollman.

Some interesting sketches of forms of beams of uniform strength are added, as well as two very valuable tables, not often found in American works, and similar to those in Brandt's "*Eisen-Constructionen*," Reuleaux's "*Constructeur*," Clarke's "*Graphic Statics*," "*Ingenieur's Taschenbuch*," etc.

The first table contains sketches of most common forms of section of beams and columns, with formulæ for their sectional areas, moments of inertia, and distances from neutral axes to most distant fibres of the sections. The value of this table is increased by the fact that the more recent formulæ for wrought-iron columns and struts contain the radius of gyration of the cross-section, equal to the square root of the quotient of its moment of inertia by its area.

The theory of flexure is applied to beams supported and loaded in various ways, and the special formulæ and results obtained are arranged in a second table of even greater value. This contains a sketch illustrating the mode of support and of the loading, the general equation for bending moment, equation of elastic line, breaking load, and relative strength of beam, with a diagram showing the manner in which the values of the bending moments vary from end to end of the beam. This table comprises just the data required in practice, very conveniently arranged for convenient reference and comparison.

In Chapter IV is to be found a general graphical method for obtaining the numerical value of the moment of inertia of any given cross-section, as well as the position of its centre of gravity. The reader should remember that the sections shown are at right angles with their actual positions, being rotated ninety degrees to the left. The method here given is theoretically correct, but quite complex in application, and there is considerable liability to error in computing the radius of gyration of each slice or lamina of the section. Practically, the much simpler process usually found in works on graphic statics will be found preferable, since the results obtained closely approximate the true values, if the method be properly applied. The laminæ should be taken as thin as possible, the equilibrium curve substituted for the polygon first obtained, and the area between this curve and its end tangents may then be readily found by means of a good planimeter (Clarke's "*Principles of Graphic Statics*," p. 112).

Part II of this work is devoted to explanations of the proper methods of computing the sectional dimensions of truss members from the strains acting upon them, with an examination of the different modes in which the members of trusses are connected together, which is supplemented by lists of the elementary parts of bridges, and a complete design of a given bridge, comprising all necessary papers and drawings.

Dead loads and wind pressures are first considered, especially for bridges, with tables of amounts of live and dead loads, weights of roof coverings, of trusses and bridges of various spans, with formulæ for approximate weights of trusses by Trautwine, Stoney, Rankine and Unwin.

Buck's method of making allowance for weights of the members themselves, by increasing their sections, appears to be new, and will be found very valuable in practice, because it is so easily applied.

The author very properly remarks that the determination of sectional dimensions of pieces is of equal importance with finding the strains acting on them, though this is usually ignored by most writers. Valuable data have been collected from various authorities, and a very convenient table of maximum permissible strains in compression, tension, and shear is given from members of wrought-iron bridge-trusses.

The formulæ for hollow cylindrical columns of cast and wrought iron are of the form known as Gordon's, though containing numerical coefficients differing materially from those given by Wood, Trautwine, Rankine, etc. The formulæ for "Square," "Phœnix," "American" and "Common" (1) columns are identical with Whittemore's (Trautwine's "*Civil Engineer's Pocket-Book*," p. 233).

The formula for latticed wrought-iron columns is considerably different from those proposed by Professor Burr (*Papers P. E. Sci. Soc.* II, No. 5).

The mode of application of these formulæ is not explained, though this is likely to perplex the student at first.

The author appears to entirely ignore the great progress made during the past five years in the study and use of wrought-iron columns and struts, and their appropriate formulæ, for no mention is made of the following, or any use made of the valuable results obtained: —

The very valuable experiments made by Bouscaren on different types of wrought-iron columns and bridge struts of full size (*American Architect*, Vol. XI, p. 114).

The excellent series of formulæ deduced from the results of the preceding experiments by Professor Burr (*Papers P. E. Sci. Soc.* II, 2.)

Experiments on full-size Phœnix columns by United States testing-machine, at cost of Clarke, Reeves & Co., and discussions of these experiments (*Trans. Am. Soc. Civ. Eng.*, February and March, 1882).

Experiments on wrought-iron and steel by United States Board.

The Rational Formulæ for Bridge Struts and Columns, deduced by original investigations, by Professor Robinson (Van Nostrand's *Scientific Series*).

It must certainly be presumed that the author is well acquainted with all these results, and it is rather surprising that they are not used in the work. It is evident that the treatment of the subject of columns is defective, being at least five years behind the best American practice, a grave fault in a text-book.

Chapter III comprises examples of the mode of computing dimensions of floor-beams, their flanges, webs, and riveting; suspenders; eye-bars or links, and diameters of pins.

It is stated that steel pins should have about four-fifths the sectional area, or seven-eighths the diameter of those of wrought-iron for similar strains, making them rather larger than is usual in practice (Carnegie's "*Pocket-Book*," p. 236).

Tables for diameters of pins, thickness of end bearings, as well as for rivets, are added from Carnegie's "*Pocket-Book*." The rules for riveting are from Rankine's "*Applied Mechanics*," p. 299. No mention is made of steel rivets, or of the common practice of diminishing the spacing of rivets from middle to ends of built beams, a point of considerable importance (Burr's "*Stresses*," p. 309).

Chapter IV contains numerous illustrations of the joints of bridge-trusses used by the best bridge-building establishments. It is abundantly illustrated by geometrical and by several isometrical views of joints, and is simply indispensable to the student and bridge-engineer, forming one of the most valuable features of the book, far more valuable than anything heretofore published on this subject.

In Chapter V is to be found a detailed explanation of the routine method pursued in designing a bridge, making out the strain-sheet, bill of materials, estimate, shipping bill, and full general and detail drawings. The system is applied to an actual example, with a full and complete set of papers and drawings, and its importance to the student can hardly be over-estimated, since it gives a full description of the routine methods for saving labor and insuring accuracy, actually employed in a first-class bridge-works, a kind of information which has rarely been accessible to persons not actually employed in such establishments.

The last chapter contains forms of advertisement for proposals, proposal and bond, contract and specifications, with a general specification for bridges of wood, wrought-iron and steel. This general specification largely embodies the practical data and formulæ previously given, in a condensed form and arranged for easy reference, as well as to prevent omissions in writing out specifications. It is really a condensed treatise on bridge construction, and well repays close study.

Much may also be learned from it in regard to the proper mode of inspecting and testing the materials supplied by the contractor.

In conclusion, we may say that the work cannot be recommended as being likely to give all the information required by the architect for designing roof-trusses, though much of the data given for dimensioning bridge-trusses is equally applicable to roof-trusses; but the modes of connecting the truss members are essentially different in roofs and bridges. Still the great quantity of valuable data, formulæ, tables and general information contained in the work will be worth to the architect many times its cost for general purposes.

But it will be found indispensable to the bridge engineer, to the student desirous of mastering the details of bridge construction, and to the architect, who may be called on to construct trusses of forms similar to those of bridges, since, in spite of the defects here noted, it is undoubtedly the most valuable work on bridge construction ever published in this country. It is to be hoped that its defects may be remedied in a second edition.

RECENT BOOKS ON ART.


Statue of Michel Angelo by O. Tabacchi from the Art Exhibition Rome.

THE attention of art students should be called, I think, to a series of small handbooks now publishing in French by Quantin, of Paris. It is ultimately to consist of one hundred volumes, published at a uniform and very cheap rate, is called the *Bibliothèque de l'Enseignment des Beaux-Arts*, is issued under the patronage of the Administration des Beaux-Arts and numbers amid its authors most of the many well-known names in French criticism. It is to embrace a certain number of the "general treatises" dealing with the different arts in a cursory but comprehensive way, and a larger number of volumes devoted each to some special craft or subdivision of a craft. The volumes thus far published vary in value, but taken together amply justify one in praising the series as a whole.

Among the latest are two on engraving—one, "*La Gravure*," by Vicomte Henri Delaborde, which is a history of the art, and the other, "*Les Procédés de la Gravure*," which is a technical treatise and is written by Alfred de Lostalot, editor of the *Gazette des Beaux-Arts*. Strangely enough these volumes, which from the character of their authors we might have expected to be very good, are much the poorest thus far issued. If none of their companions had been more successful the series would not have been worth our notice. To begin with, a subject which is and must be one and indivisible has been arbitrarily cut in two. It is impossible, especially in books intended, as are these, for beginners, to discuss the history of engraving without referring to its processes; impossible to describe its processes without citing the facts of its history. In their desire not to encroach upon one another's ground the authors have made their several volumes fragmentary, disjointed, and, I should think, almost useless to the youthful scholar; but besides this, the volume of M. de Lostalot, who by the nature of his main occupation in life should be thoroughly familiar with the processes of engraving, is so confused, so injudicious in arrangement and often so mistaken in matters of fact as well as of taste that we marvel at its issue from a French press. It is particularly lacking in the qualities so constantly found in French criticism that we grow to believe them a necessary factor therein, grow to expect them on every occasion as we do not in critical works in other languages — in the qualities of clear vision, logical reasoning, and precise, definite, systematic presentation. Nor is Delaborde's history of the art much better in arrangement or in judgment. The engravings are necessarily poor in all the volumes — it would not be easily possible to give good cuts, even of mechanical sorts, in any profusion at the price of four francs for a bound volume. In most of the books the poor pictures do not greatly trouble us — we accept them for what they are, as signs merely and rough symbols of the works discussed. But when it is a fine *engraving* that the very poor engraving pretends to show, the discrepancy afflicts us more.

It is a pleasure to turn from these unsuccessful volumes to the others thus far issued, all of which merit praise, but of only two of which, the latest and I think the best, I have space here to speak. One of these is the sketch of English painting by M. Chesneau. It is of peculiar interest to American readers, for these are usually not very well acquainted with its products themselves, and can turn to no complete and systematic account of it in their own language. Even had such been now written for us by an Englishman it would most likely be less satisfactory than the present volume; for as English critics show themselves in their many more fragmentary essays on the subject, they write usually from a very narrow standpoint, are insular, and not cosmopolitan in their taste, and are either unable or unwilling to judge native products by any extraneous standards. English critics have found much to object to in M. Chesneau's criticism, but it is not by that proved less true or less valuable. The author wrote some years ago a similar treatise in another form which was much more condemnatory of the school than this later volume, but even this — the fruit of many years of study and of a keen and, it seems to me, just and impartial taste — is not flattering enough to suit the English view of English art. It is therefore, I repeat, a very valuable contribution to our knowledge of the subject, correcting and modifying the exaggerated idea about English painting, past and present, which we derive from English writers — doing for us what we must do for ourselves when we first see the works of the school after having read about them in the pages of a Ruskin or even of a Hamerton.

The reader who goes to London with M. Chesnau to guide his anticipations will have a far less frightful disenchantment in prospect than he who goes filled with a memory of these panegyrists. He brings no violently French prejudices to his task and can appreciate the good he finds whether it is of the sort to which he has been used at home or not. But he speaks from the point of view of a Continental critic, which is, I need hardly say, almost antipodal to the point of view of his British brother. That is, he looks at art from an artistic — a pictorial and technical — standpoint and not from a literary, moral or sentimental one. He ranks first the qualities which the typical English critic ranks last or ignores entirely, so it is not strange if his verdicts, general and particular, should often be a reversal of those we have been used to reading. His sketch is of necessity brief, but it is well ordered, clear, and comprehensive. With great good taste he speaks in detail of the most typical personalities on his list and passes over with briefer mention those which may be as well known to local fame but are intrinsically less important. The really great men of past days — such as Reynolds and Gainsborough — he praises as they deserve, and his analysis of such a man as Hogarth is as acute as instructive. To Blake I think he hardly does the justice he might in even the few lines he devotes to him. But this would have been too much to expect from any Frenchman, however acute, however catholic. A German critic would do better here, and it would be interesting to have the verdict of such a one to set against the over-praise recently bestowed upon Blake by his own countrymen. The recent school is wisely judged and not without sympathy and admiration; and a final chapter speaks of caricature and the work of the latest school of illustrators, lauding Miss Greenaway, Caldecott, and the rest in a way that must satisfy even their English admirers. It is a pity, I think, this little book cannot be translated into English. I am told that so little interest is taken here in English art that it would not be worth a translator's while to undertake the task; but if this is so it speaks badly for the status of our art students and amateurs.

The other volume to which I have referred is a History of Tapestry by one of the best known and best equipped of French critics—M. Eugène Müntz. Nothing could be clearer, saner, more complete and satisfactory than this little treatise, which should find good audience in this country now that so many examples of ancient tapestries are being yearly brought here and exhibited in various places. M. Müntz is a little hampered at the outset of his task, for the early history of tapestry — which is the art of *hand weaving* in colors, and is distinct on the one side from embroidery and on the other from the mechanical work of the loom — is so closely bound up with these two allied branches that it was difficult for him to speak of it clearly without trespassing on ground that is to be occupied by other writers in forthcoming volumes of the series. In his desire to avoid this trespass and yet speak of ancient works which we know through written descriptions only, and which *may* have been tapestries but cannot be proved to have been such, M. Müntz is sometimes a little fragmentary, and, what is always disagreeable to the reader, a little apologetic in his style; but after the first chapter, when he stands on the proven ground of his own special branch, no one could be more clear and delightful. The illustrations, too, are less inadequate than in any of the other books. While full of enthusiasm for his subject M. Müntz does not fall into the error so dangerous to writers on special and limited topics. He does not unduly exaggerate its relative importance or admire indiscriminately all its essays, or judge them from the point of view of the antiquary or collector rather than of the art-critic. That the works of a certain period are rare is no merit in his eyes—it is beauty alone for which he looks. And his estimate of the beauty of the products of different lands and different times is regulated by a keen sense of the requirements of this especial art and not by any general reputation gained perhaps in quite other branches. He is not constrained, for example, by the fame of Raphael and of his thrice-celebrated cartoons to give the

tapestries woven therefrom the highest place among their fellows. He criticises them very justly and shows why and how they are inferior *as tapestries* to many earlier and many later works. Nor does the vogue of the French factories in the last century lead him to undue praise of what was really a decadent phase of the art. And, best of all, he is unsparing in his condemnation of the present products of the state factories in their inane attempts to achieve the results of pictorial methods instead of those equally artistic and equally splendid results which are proper to the tapestry-maker's art and to it alone.

The historical paragraphs of his book are as interesting as the critical, and not only give us instructive glimpses both into the ways and manners of the artisans of different periods, but show in a way that will, I am sure, surprise most of his readers, the immense extent to which the art was practised in mediæval and Renaissance days, the high esteem in which it was held, and the way it stood actually side by side with the painter's art in the judgment of purchasers and artists. The facts and figures and lists he gives are of extreme interest, and should attract to the volume those who wish to get a fresh glimpse at the civilization, the tastes and the manners of past epochs, as well as those who are specially concerned with the art of which he treats. Constant and useful reference is made on almost every page to authorities who will carry the reader farther than M. Müntz can take him in this little book. And another source of surprise, perhaps, will be the knowledge here gained of the immense number of books that have already been written in French on this one subject — a subject which we might suppose, too, of not the most general interest. It is only one sign of the richness of the French in critical writers, and of the vastness of the public to which these can safely appeal. Contrasted with the poverty of English-speaking countries in both these respects the difference is enormous. No reader of this book who remarks the profusion of the references and quotations will doubt that to know this or any other branch of art or archæology, it is to-day as necessary for the student to acquaint himself with the French language as it is for the budding theologian to study German. And the mass of critical art-writing annually published in Paris is in no greater contrast with the amount of that published in London, than is its quality with the quality of the latter. Mr. Bouton is the agent for these useful little books in New York. It is to be wished that they might be more widely offered for sale, and more widely read, than has yet been the case.

M. G. van Rensselaer.

MR. BOYLE'S INDIAN GROUP.

IT is not very often that one feels called upon to direct, however modestly, the attention of any but the most limited and local of publics to such works of art as the average private patron is accustomed to select as a monument of his generosity and public spirit on the one hand and of his fostering care for the arts on the other.

The public places of American cities have, for the most part, a sorry tale to tell of the treatment to which they have been subjected by this class of eminently respectable and well-meaning persons, and here in Philadelphia the evil has grown so great that instead of a society for promoting the erection of memorials, like that in Boston, there is actually a systematic effort making to remove the eye-sores, in the form of fountains chiefly, erected at considerable expense by those kindly but misguided spirits of another age, who, for all their good intentions, do not seem to have been exactly commissioned by it as apostles to our own.

Occasionally, however, this irresponsible kind of liberality is more fortunate, and of this happier choice Mr. Boyle's group is certainly an admirable example. The group is of bronze, and is destined for Lincoln Park, Chicago. It is the gift of Mr. Ryerson, a gentleman sensible enough to give the commission to a young and, at the time, comparatively unknown artist whose only claim was that he had done good work. Not much of a claim, you will say, and about the last to be recognized in the giving of commissions, but as I said before, this is an exceptional case.

The group, as it stands, is not only by all odds the strongest piece of modelling that has ever been done in Philadelphia, it is, in my opinion, the first instance of a successful grappling with the Indian question in American art. The Indian who is here presented is not the theatrical figure who has paraded so long in his wretched toggery of wampum and war-paint, but neither is he the ignoble and skulking creature which just at present it is the fashion, in certain very influential quarters, to make him out to be.

So essentially modern is the work throughout; so free is it from the conventionalities and make-believe classicalities which have done duty in sculpture so long after being rejected by the painters, that perhaps the first strong impression which the observer receives is that of humble and faithful study of nature; of fidelity, in even the smallest details, to well chosen, but by no means exceptional models.

The principal figures might be, and probably are, thoroughly honest portraits — neither more nor less, (they do not seem to be less and we are fast learning to feel that it is not possible for them to be more,) — but in the dignity of its conception and the masterly way in which it has been worked out, the group stands for much more than this: it stands for, and embodies, the idea of the race and its experience. Its attitude is that of expectancy — it is hardly one of welcome on the part of the man at least, though there is neither fear nor defiance in his face, and he carries no weapon more formidable than a pipe, and though the woman's look is kindly and hospitable; but the man's face is full of distrust, and it is evident enough that the visitor who is approaching is white and that he is not much of a stranger any more. The contrast of the masculine with the feminine attributes, is admirably preserved throughout and makes one of the principal charms of the composition. The woman's figure has a soft and clinging quality with all its evidences of ungentle experience, while the man, peace-pipe or not, is unmistakably alert and on his guard.

The weak points of the work, if one can be ungracious enough to note them, are undoubtedly to be found in the dog and the papoose. The faults of these are insignificant, perhaps, but one cannot help regretting that the baby was not made a little more interesting, and the unity of the impression certainly suffers from the fact that the dog, more vigilant even than his master, is not looking in the direction from which the stranger is evidently coming.

The height of the principal figure is six feet eight inches, and that of the group is seven feet eight inches. It is to rest on a granite pedestal about ten feet high in the die of which are to be set four bas-reliefs, also in bronze, illustrative of Indian life and customs. These bas-reliefs are still in the sculptor's hands, but one, "The Corn Dance," is already cast and is certainly a very spirited performance. If the three others are as good as this the whole will form an extremely interesting series.

L. W. Miller.

THE ILLUSTRATIONS.

HOUSE ON A TWENTY-FOOT LOT, CINCINNATI, O. MR. CHARLES CRAPSEY, ARCHITECT, CINCINNATI, O.

THIS dwelling has just been completed for Mr. Joseph C. Harrell. The lot is on Ninth Street near Mound Street, and is 20 feet front by 100 feet deep to a 15-foot alley. The front is laid up with Zanesville red pressed-brick with black mortar, sunk joints. The inside is finished in white-pine, varnished. The total cost is $6,800.

A BRONZE GROUP OF INDIANS, FOR LINCOLN PARK, CHICAGO. MR. JOHN BOYLE, SCULPTOR, PHILADELPHIA, PA. DRAWN BY MR. JOSEPH PENNEL.

See the preceding article.

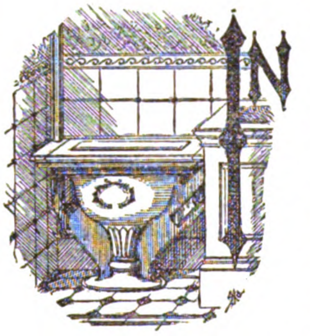
THE U. S. COURT-HOUSE, MINNEAPOLIS, MINN. MR. JAMES G. HILL, ARCHITECT, LATE SUPERVISING ARCHITECT OF THE TREASURY DEPARTMENT.

OFFICES AND KEEPER'S LODGE, ALBANY CEMETERY, ALBANY, N. Y. MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

THE SNEER BUILDING, DES MOINES, IO. MESSRS. FOSTER & LIEBBE, ARCHITECTS, DES MOINES, IO.

SANITARY PLUMBING.[1]—IX.

THE "SELF-SEALING" CLOSET.—GENERAL CONSIDERATIONS.



IN ORDER (1) to secure a rigid, safe and durable *connection* with the supply and waste pipes, we cannot rely upon a material so brittle and treacherous as earthenware, or anything resembling it. The joints have to be screwed together with strong bolts, under powerful leverage, and with no delicate hand, if we wish to obtain a permanent tightness which shall withstand the jarring and shrinkage of the joists and the pressure of the water.

A plumber is always fearful of breaking the flanges of crockery in screwing up the joints, and the result is they are never as tight as they should be. Metal alone has the strength requisite for this purpose, and the metal at the joints should be firmly connected with the body. The water-closet should therefore be framed in iron. Properly arranged, this form of construction does not greatly increase the cost of manufacture, as will be seen.

(2) To secure *noiselessness* is a more difficult problem. How shall a stream of water be brought to bear upon the standing water and

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[1] Continued from page 225, No. 411.

waste matters in the bowl and trap, and with the unbroken power given by its descent from the cistern, so as to eject them forcibly, suddenly and completely into the waste-pipe, and yet without noise?

It is evident that the water must serve as its own sound-deadener, since we have no valve, plunger or other moving part in the closet to assist us. A stream of water may be rendered noiseless, however rapid and powerful its movement, by properly directing it into a body of water larger than itself, provided the point of entrance be below the surface. The flushing stream must therefore enter the water-closet below the normal level of its standing water.

It is not sufficient to do this in the manner that is employed in the "trap-jet" closets, for the jet in these at once throws the standing water out of its way, and then makes an uproar even more appalling than the ordinary flushing stream. In these "trap-jet" closets, the water used for cleansing the upper part of the bowl, when used in combination with the jet in the trap, is not only insufficient to keep the lower jet covered, but makes a noise of itself after the usual manner with hopper-closets; so that the two together render the "trap-jet," as heretofore made, the most clamorous of all water-closets.

The upper flushing stream should furnish a body of water nicely calculated to keep the lower stream just covered, and should itself be noiseless. The former result is easily obtained by simply adjusting the size of the upper and lower flushing openings with reference to each other; the latter, by constructing a special pocket or water-chamber, into which the upper stream may be projected before it enters the bowl. Theoretically, all noise of the flushing is by this means obviated; practically, a slight sound is still perceptible. To render this inaudible, a further precaution must be taken. With earthenware closets, the seat and cover have to be supported independently of the bowl, which is not strong enough itself to do the work with safety. A clear space is required between the bowl and the wood-work. Hence, especially when, as is now quite customary, the water-closet is set "open;" that is, without casing on the sides and front, the cover cannot serve as a sound-deadener, because it cannot be fitted closely to the bowl. By encasing the closet, however, in an iron frame, the seat and cover may be fitted closely to its top, and be made tight enough to quite obscure what little noise is made by the submerged flushing streams. A small glass panel may be framed in the wooden cover, if desired, to enable the effect of the flushing to be seen when the cover is closed.

(3) *To avoid wastefulness of water*, it is necessary that the flushing stream should encounter no obstruction of any kind in its passage from the cistern to the water which is to be removed from the closet, so that its full power shall be reserved for ejecting the wastes. Every drop of water should be brought to bear upon them in such a manner as to produce the most powerful effect; for what is lost in power must be compensated for in volume. In the pan, valve and plunger closets, the power is destroyed by the obstructions which distinguish them. In the hopper-closets, much of it is uselessly spent in dashing against the sides of the bowl and trap in a haphazard and unscientific manner.

(4) The interior surface of the bowl and trap should constitute the whole interior surface of the water-closet. There should be *no waste space* between or outside of them. To obtain this desideratum, we are forced to adopt the simplest possible form of the short-hopper, only enlarging the bottom of the bowl to embrace a greater body of standing water, and raising the outlet of the trap high enough to retain such a body in the bowl. This is the simplest and indeed the only method.

(5) The *delay* occasioned by the water falling from the cistern to the closet may be avoided either by having the supply-valve at the bottom instead of at the top of the supply-pipe, or by so constructing this pipe that the water shall be held or hung in it below the valve, as far down as to the water-closet, by the pressure of the atmosphere.

(6) *Spattering* can be avoided by introducing the upper flushing water in a smooth sheet of equal thickness all around the rim of the bowl, released from pressure, and directing the lower flushing water towards the outlet of the trap.

(7) *Accessibility and visibility* of all parts of the bowl and trap are to be obtained partly by the adoption of the simple hopper form, and partly by the use of transparent glass for the material of the trap.

(8) A proper *material* is found in glass framed in iron, with an intermediate layer of some water-proof binding material. Glass does not craze or discolor when used for water-closets. Its texture is uniform throughout, and it may be manufactured with unvarying accuracy of form, because it is blown and cooled in a mould, and is not subjected to the warping and modifying influences which earthenware must undergo in baking and glazing.

(9) To provide a rigid frame for the *protection* of the fragile parts, so that, in transportation, as well as in usage, it shall be safe, it is necessary to use an iron frame.

(10) To make the closet *self-sealing*, it is necessary to provide a reservoir which shall yield its water-supply instantly when, and only when, the water in the trap falls to a determined point immediately above the dip. A datum in the problem is that such an automatic supply-reservoir shall not add to the expense or complexity of the closet. It is no solution to add to the trap a small reservoir provided with ball-cock and float, and having its normal water-level corresponding with that of the trap. Such methods have been tried, but have failed on account of their complexity and expense, and their liability to become clogged by the wastes in the trap, or corroded through disuse of their machinery. A suitable reservoir is to be found for this purpose in a part of the water-closet apparatus which already exists. The supply-pipe in the best modern sanitary closets has a considerable holding capacity, it having been enlarged to avoid friction and yield a large volume of water in a short time. Its size may, of course, be further increased, where a still greater capacity is desired, without detriment to the working of the closet. How shall this pipe be formed and connected with the closet in order to regulate its supply as required?

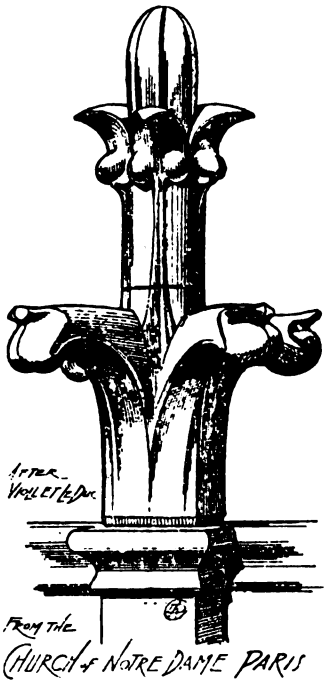
It is well known that Nature "abhors a vacuum," to the extent of resisting a pressure of a column of water thirty-three feet high, and this principle is illustrated by the familiar experiment of the inverted bottle filled with water and retaining its contents, open-mouthed, so long as the mouth stands immersed in a bowl of water. The water is sustained by atmospheric pressure, and appears to hang in the bottle. Our supply-pipe may be used as an inverted bottle, and the water-closet and its contents as the bowl of water. The cistern-valve, without air-pipe, takes the place of the closed end of the bottle. When the supply-pipe is filled with water, it will allow its contents to escape only when the valve is lifted or the water in the closet falls below its mouth.

The manner in which the valve should be formed and operated under this heavy atmospheric pressure, and the method of connecting the pipe with the water-closet, are matters of detail, and will be explained hereafter.

(11) To enable the closet to be *emptied* with ease when desired, it is necessary that the removal of the water from the bowl, trap, and supply-pipe should be automatic, and the only way to accomplish this is to provide a direct passage for it into the soil-pipe. The passage should be so arranged that it cannot, under any circumstances, serve also as an inlet for sewer-gas.

(12) To avoid the *expense* involved by the attempt to bake large and irregular pieces of earthenware, and the *inaccuracy* of form necessarily resulting therefrom, the best method is to do away with earthenware altogether, and to adopt materials and a form of construction much better fitted for our purpose.

LECTURES ON ARCHITECTURE.[1] — VI.



BUT when the nature of religious worship was changed by the increasing prevalence of Christianity, the portico and exterior colonnade were no longer the principal object in a building. The horizontal line was therefore lost sight of as the fundamental idea, and until a new one developed itself, every attempt to adapt the old style to new circumstances produced only contradiction and confusion.

By degrees, however, this new idea did at length arise, and with it a new style of architecture came into being. As processions had been the characteristic of the Egyptian worship, and popular gathering round the temple and under the shelter of colonnades was the chief object in the Grecian, so Christianity introduced a wholly new practice, not without its symbolism and mystery also: that of collecting a whole assembled congregation under one roof. It was a remarkable peculiarity, full of deep meaning and pregnant with important architectural results.

In the *Christian* temples, says Dr. Whewell, the worshippers were to be *within* the walls, and the edifice was hence calculated for an interior spectator. It is remarkable how necessarily this will be seen, on a little consideration, to change the whole character of the building. A temple, or a series of temples, intended to be seen from without, and formed on the Grecian model, would have a line of entablature which would have a natural and congruous reference to the horizontal line on which they stand, and it would not happen, in any common point of view, that this reference would be interrupted or obscure. The temple would then be seen as a whole, and the entablature of one or two sides, supported by well-formed pillars, would be simply beautiful. But for buildings to be seen from within, the case is wholly different. To extend them by an extension of horizontal lines of entablature resting on columns, would produce an interior space without grace, dignity, convenience, or the possibility of being lighted from without. When such buildings were to be made spacious and splendid, the height was increased, at least in proportion to the other dimensions, and probably even more, and windows, one range over another, were inserted in order to light this space. The area was covered with a series of vaults, one to each window or group of windows, and the intersections or groining of such vaulting

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[1] Extracts from a lecture by the late Mr. Arthur Gilman, delivered before the Lowell Institute, Boston, in the winter of 1844-45. Continued from page 210, No. 410.

of necessity led to pointed arches, vertical lines, and other Gothic features. But it may further be noticed that, even without taking into account the consequences of stone vaulting in the roof, the interior views of large churches necessarily introduced the idea of a style of building which had reference to vertical lines. How strongly, and indeed exclusively, these predominate in a true Gothic building may be seen from the drawing before you. Now the interior view of any building occupies the whole of one field of view, and not a small fraction of it only, like a temple seen from a distance. Hence it is that the horizontal lines are displaced and overmatched by the perspective; the sides, however long the building may be, are reduced to narrow strips, in the eye of a person looking along the edifice, and the two perpendicular lines which bound the end and divide it from the sides are, in reality, the master lines of the whole scene, which control and regulate all the rest. All the horizontal lines of the sides are stopped or bent when they come to these vertical boundaries, while the spaces on either side of them, that is, on both the sides and the end of the interior, are made up of forms and combinations altogether at variance with the horizontal line. The style of the building, therefore, which is to be viewed on the inside, will only be reduced to harmony and consistency when the principal lines and members of the architecture submit to be regulated by these necessary and irresistible forms.

I have previously adverted to the fact, also, that Gothic architecture seems designed to carry the mind upwards by the perpendicular direction and tapering forms of all its principal members. No one can be at a loss to account for the origin of this idea. With Christianity, observes the anonymous writer before quoted, there came also into religion another idea, that of elevation. If permanence and immutability were the character of the Egyptian system, and symmetry and rationalism those of the Grecian, elevation is also the peculiar idea of Christianity. It raised man from the ground, lifted up his nature to a communion with the Deity, and led up his eye in constant hope to another world and a heaven above him; it roused his intellect and sublimed his affections, filled the whole sphere of his vision with grand and aspiring spectacles, shook off the chains of the slave, dignified the helplessness of woman, fractured the barriers of castes which had kept their subjects in a state of perpetual degradation, and introduced into the whole nature of man a tone of noble and lofty thought, which it imparted freely to all. And there is nothing fanciful or arbitrary in asserting a close connection between the moral and spiritual elevation of the Christian doctrines, and the physical forms in which the idea soon became embodied. If, indeed, we cannot express the former without using words derived from the latter — if we cannot witness goodness and power without both thoughts and gestures which mount upwards, we may be sure that there is a close and indissoluble connection between the two, and that such thoughts as lift themselves up from earth to heaven will embody themselves in structures which exhibit a similar analogy.

Upon these two new ideas combined arose, then, the system of Gothic architecture: the system of the vertical line and of the pointed arch. The vertical line was its primary idea, and the necessity of an inclosed roof was the circumstance which developed it, with all its more important consequences. Its first movement is to be traced in the piling up of range upon range of columns and circular arches, in the structure of towers, and in the unnecessary elevation — unnecessary so far as mere ordinary utility was concerned — which was given to the interior of the Lombardic and Norman churches. The second may be seen in the attempt to bind two or three stories of arches together, by one shaft or slender column running up through them all, and projected so far from the face of them as to form the prominent and leading lines in the building. On the exterior the same kind of effect was produced by the buttresses, or masses of masonry projecting from the walls. But the fundamental idea of elevation once introduced, it soon became necessary to remodel all the parts of the building, to bring them into accordance with it, and it was in the delicate perception of this accordance, and the skill with which it was effected that we must look for the spirit from which the perfection of Gothic architecture really emanated. The exterior of the roof or ceiling was probably the first part which required to be adjusted to the new type. A ceiling either flat and horizontal, or circular and barrel-shaped, was felt to be inconsistent with the primary idea of elevation, for either of them compelled the eye to depart from its ascending line and move in an opposite direction, and perhaps, of the two, the circular arch was the most inconsistent, because it is not content, like the flat roof, with abruptly cutting short the ascending line. The heavy and oppressive effect of a semi-circular ceiling, too, belonged to a more dark and massive style than the one which was earnestly struggling its way into being.

How, then, was the necessity of an inclosed ceiling to be reconciled with the preservation of the ascending line, and made to harmonize with the sentiment of such a mode of construction? There was one way, and one only, and it is exhibited in the figure of an equilateral triangle, placed on the summit of the parallelogram which is enclosed by the walls. Though sadly disfigured by the lowering of such roofs, during centuries of subsequent alterations and repairs, *all* the Gothic edifices, when first erected, were covered with such roofs as these. The figure formed by them is as peculiarly Gothic as the truncated triangle is Egyptian, and the depressed triangle and horizontal parallelogram are Grecian. It everywhere occurs in the roofs and gables, or shoots up into a still sharper form in the pinnacles and spires. The arch, which is measured by it, and is called from hence the equilateral arch, forms the opening of the doors and windows, of the vaulted roofs and ceilings, and, in short, is repeated in every part of the structure. And of the several varieties of the Gothic arch, it is justly considered the most appropriate and most beautiful.

The ascending vertical line being once taken as the leading feature, it will be evident that all the other parts of the structure required to be modified into accordance with it. The whole general outline of the Gothic building accordingly became changed. Instead of running along the ground, it rose up into towers terminating in pinnacles, or in the symmetrical figure of the tapering spire. Its parts, instead of being arranged in regular correspondence, as they had been in the classical styles of architecture, were now clustered in groups of projections, thrown out in apparent disorder from the main fabric, and even studiously diversified in their arrangement, that the eye, instead of indulging the Greek taste for reference and comparison, might be prevented from any lateral or horizontal movement, and be carried constantly upwards. The true Gothic taste abhorred those features which the mistaken "modern Gothic" scarcely ever dispenses with — a centre and two wings. It never placed the spectator in any one point, as did Grecian art, but allowed him to move about the whole edifice, making every place a centre from which the eye could rise to some lofty point which would still throw all the parts into the Gothic figure of the elevated triangle. Thus life, power and energy became the natural associations with this style, while a wonderful variety of detail was introduced without at all destroying its harmony, because all of them, however distinct, were originally included or implied in the one fundamental figure.

The style of the pointed arch, on its introduction into Europe, does not appear to have been accompanied by those peculiar features which were its invariable accessories in after time — its light, clustered pillars, its profusion of ornamental mouldings, and gracefully sculptured tracery; these resulted, subsequently, from its adoption, as the forms of ornament most congruous to the nature of the style.

ARCHITECTURAL MONOTONY OF PARIS.

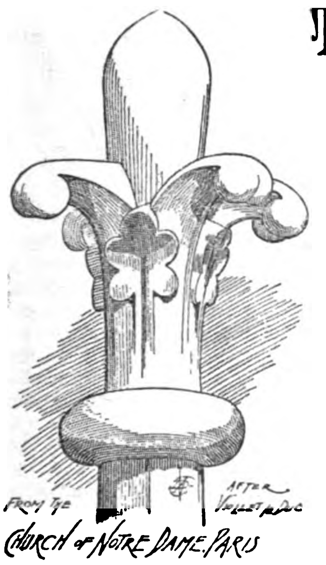
STATUE OF LAFAYETTE AT LEPUY FRANCE

THE fixed perspective of Paris neither elongates nor contracts with any change of atmosphere, so that the apparent distance from one point to another remains always the same. Reduced to the simplest elements the street architecture of Paris consists of two parallel lines, which to the eye appear to gradually converge. In sunshine and shade the sides of the street approach in an unvarying ratio; a cloud goes over, and the lines do not soften; brilliant light succeeds, and is merely light — no effect accompanies it. The architecture conquers, and is always architecture; it resists the sun, the air, the rain, being without expression. The geometry of street can never be forgotten. Moving along it you have merely advanced so far along a perspective, between the two lines which tutors rule to teach drawing. By-and-by when you reach the other end and look back the perspective is accurately reversed. This is now the large end of the street, and that which has been left the small. The houses seen from this end present precisely the same façade as they did at starting, so that were it not for the sense of weariness from walking it would be easy to imagine that no movement had taken place. Each house is exactly the same height as the next, the windows are of the same pattern, the wooden outer blinds the same shape; the line of the level roof runs along straight and unbroken, the chimneys are either invisible or insignificant. Nothing projects, no bow-window, balcony or gable; the surface is as flat as well can be. From parapet to basement the wall descends plumb, and the glance slips along it unchecked. Each house is exactly the same color as the next, — white; the wooden outer blinds are all the same color, a dull gray; in the windows there are no visible red, or green, or tapestry curtains, mere sashes. There are no flowers in the windows to catch the sunlight. The upper stories have the air of being uninhabited, as the windows have no curtains whatever, and the wooden blinds are frequently closed. The flat vertical surfaces, one on each side of the street, each white and gray, extend onward and approach in mathematical ratio. That is a Parisian street.

Go on now to the next street, and you find precisely the same conditions repeated — the streets that cross are similar, those that radiate the same. Some are short, others long, some wide, some narrow; they are all geometry and white paint. The vast avenues, a rifle-shot across, such as the Avenue de l'Opéra, differ only in width and in the height of the houses. The monotony of these gigantic houses is too great to be expressed. Then across the end of the avenue they throw some immense façade — some public building, an

opera-house, a palace, a ministry, anything will do — in order that you shall see nothing but Paris. Weary of the gigantic monotony of the gigantic houses, exactly alike, your eye shall not catch a glimpse of some distant cloud rising like a snowy mountain (as Japanese artists show the top of Fusiyama); you shall not see the breadth of the sky, nor even any steeple, tower, dome or gable; you shall see nothing but Paris; the avenue is wide enough for the Grand Army to march down, but the exit to the eye is blocked by this immense meaningless façade drawn across it. No doubt it is executed in the "highest style;" in effect it appears a repetition of windows, columns and door-ways exactly alike, all quite meaningless, for the columns support nothing, like the fronts sold in boxes of children's toy bricks. Perhaps on the roof there is some gilding, which seems to be perpetually asking itself the question why it is there. These façades, of which there are so many, vary in detail; in effect they are all the same, an utter weariness to the eye. Every fresh day's research into the city brings increasing disappointments, a sense of the childish, of feebleness and weakness exhibited in public, as if they had built in sugar for the top of a cake. The level ground will not permit of any advantage of view; there are none of those sudden views so common and so striking in English towns. Everything is planed, smoothed and set to an oppressive regularity.—*Pall Mall Gazette.*

LUMINOUS PAINTS AND COLORS.



THE luminous calcic sulphide (also called sulphide of calcium) now obtainable in the market, has a yellowish-white tint, which considerably limits its direct application as a paint. On the other hand, the calcic sulphide, or the luminous paint obtained therefrom, loses its luminous property, if it is directly mixed with the ordinary commercial paints. An invention recently patented by Gustav Schatte, of Dresden, Saxony, has for its object to produce durable white or colored paints, containing a luminous substance, which causes them to shine in the dark, without changing or neutralizing in daylight the tint of the coloring substance or substances contained in such paints. For this purpose Zanzibar or Cowrie-copal is melted over a charcoal fire; 15 parts of this melted mass are dissolved in 60 parts of French turpentine, and the resulting mixture is filtered, whereupon 25 parts of pure linseed oil are added, which linseed oil has been previously boiled and allowed to cool a little. The lake varnish thus obtained is carefully treated in a paint-mill with granite rollers and worked into a luminous paint by one of the processes hereinafter described. Iron rollers capable of giving off under great pressure small particles of iron, which might affect the luminous power, should not be used. Lake varnish as obtained in commerce contains nearly always lead or manganese, which would destroy the luminous power of the calcic sulphide. A pure white luminous paint is produced by mixing 40 parts of lake varnish, obtained as described, with 6 parts of prepared baric sulphate, 6 parts of prepared calcic carbonate, 12 parts of prepared zinc-sulphide, white, and 36 parts of calcic sulphide in a luminous condition, in an oil vessel and therein worked into a coarse emulsion which is then ground fine between the rollers. To produce a red luminous paint 50 parts of said lake varnish are mixed with 8 parts of prepared baric sulphate, 2 parts of prepared madder lake, 6 parts of prepared realgar (diarsenious disulphide) and 34 parts of calcic sulphide in a luminous condition, and the mixture worked in the same way as described for the white color. To produce a luminous orange color, 46 parts of prepared lake varnish are mixed with 17.5 parts of prepared baric sulphate, 1 part of prepared Indian yellow (*jaune indien*), 1.5 parts of prepared madder lake, and 35 parts of calcic sulphide in a luminous condition. To produce a luminous yellow color or paint, 48 parts of prepared lake varnish are mixed with 10 parts of prepared baric sulphate, 8 parts of prepared baric chromate, and 34 parts of calcic sulphide in a luminous condition. To produce a luminous green color or paint, 48 parts of prepared lake varnish are mixed with 10 parts of prepared baric sulphate, 8 parts of chrome oxide green and 34 parts of calcic sulphide in a luminous condition. A luminous blue color is produced with 42 parts of prepared lake varnish, 10.2 parts of prepared baric sulphate, 6.4 parts of ultramarine blue, 5.4 parts of cobalt blue, and 36 parts of calcic sulphide in a luminous condition. A luminous violet is produced with 42 parts of prepared lake varnish, 10.2 parts of prepared baric sulphate, 2.8 parts of ultramarine violet, 9 parts of cobaltous arseniate, and 36 parts of calcic sulphide in a luminous condition. A luminous gray color or paint is produced with 45 parts of prepared lake varnish, 6 parts of prepared baric sulphate, 6 parts of prepared calcic carbonate, 0.5 parts of ultramarine blue, 6.5 parts of zinc sulphide, gray, and 36 parts of calcic sulphide in a luminous condition. A yellowish brown paint is obtained with 48 parts of prepared lake varnish, 10 parts of prepared baric sulphide, 8 parts of orpiment, and 34 parts of calcic sulphide in a luminous condition. Luminous colors for artists may be manufactured, if in the mixture previously described the respective parts of lake varnish are replaced by the same quantities of pure East Indian poppy-oil, and the product is then finely ground and prepared. Luminous colors for oil-printing may be produced by using, instead of the above mentioned parts of lake varnish, the same quantities of pure linseed oil won by presses only, and thickened by boiling. All the paints described may be made into luminous colors suitable for making colored paper and other purposes if the lake varnish is omitted, and the thus won dry luminous colors are ground or mixed with water, and some binding substance free from acids. They may also be made into luminous wax colors for casting on hollow glass-ware and similar objects, if, instead of the lake varnish composed as described, ten per cent more of cera-japonica and the fourth part of the latter quantity of *oleum olivarum alb.*, is used, or into colors for painting on porcelain. The color is painted on porcelain, and then incinerated with the exclusion of air. The paints may also be treated with soluble glass (potash and soda-water glass).—*The Building News.*

THE TRADE IN BUILDING MATERIALS.

WE take the following from *Bradstreet's:* A survey of the amount of building going on in our chief cities and throughout the country induces the belief that the scale of operations for 1883 will prove larger than it has been for years. The applications for building permits — some of these, however, being merely extensions and improvements — made at the Building Bureau of New York City in the first six months of this year amounted to $30,000,000, and although all authorizations are not at once acted on, the new buildings in progress, with those continued from last year, or commenced in this under previous permits, represent figures equal to two-thirds of the above amount. In New England and the Northwestern sections of the country building is particularly active. In our great commercial cities the present year will be distinguished by the massive and costly structures commenced or completed. In New York the chief activity is in apartment-houses on an unprecedented scale, some of the blocks approximating, with cost of land, to half a million dollars; a number of costly churches are also going up, while of commercial buildings of a more than ordinarily imposing character — buildings indicative not only of the growing wealth of the business community, but of advancing taste as respects embellishments and conveniences — there has been a fair quota. Large structures suitable for their purpose are on all hands found to be the most paying, and the confidence of capital in satisfactory returns from these is leading to increasing investments.

This country has the advantage of great capability in producing varieties of building materials, but the contiguity of the British Provinces leads to such importations as freestone and laths, and in cements, a comparatively new industry in this country, a considerable importation takes place from England and the Continent, which has reached so far this year to about 150,000 barrels. Scotch freestone for basements and trimmings is being imported on an increasing scale. On the other hand, we export our bluestone to Canada, Cuba, Mexico and South America, its especial qualities recommending it for flagging and lower courses of buildings. The bluestone, granite and marble of New England handled in this city are chiefly brought here by water. All over the country cost of transport necessarily governs to a great extent the selection of stone for building, though with certain important edifices distance is allowed to offer no impediment to the conveyance of huge quantities of New England stone to remote Western cities.

The business in granite, owing to the larger scale on which buildings are now constructed, increases year by year in this section, Maine, which may be regarded as a granite State throughout its length and breadth, supplying the larger proportion. The price of ordinary granite ranges from 75 cents to $1 per square foot; but superior qualities, which allow of a fine polish, present an attractive surface, and are not liable to become discolored, will realize as much as $10 per foot. Notwithstanding the costliness of granite, entire buildings in different parts of the country continue to be erected of this material. The stone is cut and fashioned at the quarries according to the archite
ral drawings, and thus, on arrival, has only to be set in place.
a great portion of the freestone used here. The most
ployment of Maine granite in this country has be
tion of the piers and approaches of the East R
extreme competition among the granite qua
abundance and variety of the stone, new
ually brought to market, but it is difficul
The brownstone with which New Y
from beds of limited location in Pat
is, as a consequence, well controll

sales are chiefly in New York, Brooklyn and Boston. The stone goes no farther than Pennsylvania.

Bluestone has been employed for flagging and building purposes for half a century, but its extensive use has been more recent. Previous to the adoption here of the North River stone the quarries on the Connecticut River were chiefly drawn on for New York flagging. Pennsylvania supplies New York with a moderate proportion. This stone, which is extensively used for trimmings for buildings, for water tables, lower sills, lintels, large platforms, and for rubbing and polishing, goes to all parts of the country. The cost of the rough-quarried stone handled here does not exceed $3,000,000 per annum, but the labor expended in shaping it, with cost of freight, brings this amount up to $9,000,000. The figures given for freestone (brown) by qualified estimators closely approximate to the above. Cost of labor in cutting and dressing both bluestone and freestone has been greatly reduced of late years by the powerful iron planers employed for these purposes. The marble used in this section, a good part of it employed in interiors for mantels, is from Vermont, which supplies every desirable quality and color. Limestone from Ohio, Indiana, and even more distant States, is also furnished. An important contribution to our building materials is in Portland stone from Kentucky, of similar quality to the famous English stone of that name.

Artificial building stones have come into prominence of late in the way of concrete blocks, tiles, etc. Of these, terra-cotta, both for purposes of ornament and utility, is the most prominent, being widely used for architectural trimmings, carved mouldings, bands, cornices and for porches. It is found suitable for substantial work in which strength and durability are primarily essential. Terra-cotta has served in an important degree to aid the present general adoption of brick in structures by affording effectual contrast and aiding in picturesque design. The brick trade of New York is enormous. The supply is chiefly obtained from North River establishments, which furnish every desirable variety of texture, form and color. The number handled in New York alone may be put at from 700,000,000 to 800,000,000 per annum. The average cost, estimated by the carload, is $6 to $7. The cost is affected not only by the activity of building, but also by the favorable character or otherwise of the season for the manufacturer. Enamelled bricks for lining interiors and for floorings are extensively imported and to some extent manufactured in this country. Some new buildings contain several hundred thousand. Construction iron enters more largely than ever into our buildings, and ranks essentially, though not nominally, under building materials. Estimates for the quantities required are obtained by architects or contractors direct from the iron founders, whose works are on a large scale. Iron has found uses in building never dreamed of in the old timber days, being adapted for beams and girders, pillars, stairways, balustrades, floorings and landings, and for first stories of store frontages. Omitting from the present notice other building materials, we may mention that 150,000,000 laths are sold in this market annually, half the amount coming from St. John's, N. B. Of lime, 1,500,000 barrels are placed each year on the New York market. In Portland cement, both in foreign and home manufacture, an increasing business is being done. The sixteen cement manufacturers of Rosendale, Ulster County, N. Y., alone supply 1,600,000 barrels per annum. There are about the same number of manufacturers in Louisville, Ky., and in Pennsylvania.

CLAY ROOFING-TILE.

WASHINGTON, D. C., November 9, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—My attention has been called to an error in my letter to you on strength of hollow sheathing tiles, as printed in your No. 409, page 202. The paragraph, "No. 1 burnt 2″ clay broke at 2394 pounds," should read: No. 1 burnt clay broke at 3294 pounds.

Very respectfully, your obedient servant,
M. C. MEIGS, Bt. Major Gen., U. S. Army, Retired.

AN APPEAL FOR A CHANGE.

WOODBURY, N. J., November 10, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Gentlemen,—Your blank for renewal received. Permit me to make complaint in regard to plans and perspective views of private residences all during the entire year having been of the same general style—the "Old English." I have built fifty-one houses, and I am now tired of the one general Old or New English style. My architects are sick of them, for a time at least. Can't you give us Italian, French, American, New England, or once in a while give us a change, or *must* we all build English?

Respectfully, G. G. G.

LE we are very far from agreeing with our correspondent's classifi-
he designs which have been published in the *American Architect*
ear, we will do what we can to make his fifty-second house
ty-one predecessors by publishing this appeal. Al-
asked, we will take it upon us to say that the best
"my architects" who "are so sick of" copying
is, that their sickness may prove so nearly mor-
ly hope of prolonging their pitiful existences
n [save the mark], and allowing our corres-
n architect who is capable of devising a
out of every fifty-one times, even if he
rara avis, an *American* design.—EDS.

BOOKS.

JACKSONVILLE, ILL., November 5, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—I have been a reader and admirer of your journal for over two years and now wish to ask my first favor of you.

Please give me through your columns, the name of some good work or works on building stones. I want to post myself more thoroughly on the nature, strength, durability, appearance and manner of working the various building stones of this country. Please also name the best work on ventilation, and heating by steam or hot air.

Very truly yours, DAN. E. PARSON.

[INFORMATION concerning American building stones is not very accessible so far as we know, and unless the report of Dr. Hawes, which was in preparation for the Tenth Census, has been completed and published since his death we do not believe there is any comprehensive and reliable body of information yet published. A series of papers now publishing in the *Builder* [Holyoke, Mass.,] is of some interest and practical value. *Box on Heat* is a standard authority on heating and ventilation. Mr. R. C. Briggs's treatise on *Steam-Heating* published by Van Nostrand & Co., is brief, cheap, and reliable.—EDS. AMERICAN ARCHITECT.]

THE OWNERSHIP OF DRAWINGS.

PITTSBURGH, PA., November 10, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Will you please give me information in the following case:—

A client employs an architect to prepare a set of plans for alterations and additions to his house for a given sum; can the client claim the drawings as his property, if he decides not to build, or are they the property of the architect?

Yours respectfully, M.

[THE rule adopted by the profession, and generally accepted by the public, is that drawings, as instruments of service, are the property of the architect. If, however, the agreement was that plans only should be prepared, for a given sum, we should certainly say that this implied that the plans were to be delivered, whether they were carried into execution or not. It often happens, especially in case of alterations, that the proprietor prefers to have his plans made long beforehand, so that he can compare them at his leisure with the actual building, and accustom himself gradually to the new scheme; and if this idea had been in his mind when he made the contract with his architect for drawings, it would seem to him very hard to be refused the possession of them. It is unlikely that an honorable client would take advantage of having the custody of the drawings to deprive the architect who made them of the right to supervise the carrying of them into execution, but if there were any danger of this, the architect could do something to protect himself by copyrighting them.—EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

THE REBUILDING OF THE TEMPLE.—A gentleman named Durgin belonging in York, Me., a stone-mason, left this city on the eleven o'clock train to-day for Boston, where he will join a party of twelve other men bound for the city of Jerusalem. The party goes to help rebuild the Temple. This man from York is prompted by a sense of duty, and takes his family, personal effects and tools.—*Portsmouth* (*N. H.*) *Times.*

BURIED TREES IN WASHINGTON.—A most remarkable discovery was made by the workmen engaged in digging the foundation for the new Casino building on Connecticut Avenue, near Seventeenth Street, yesterday. In the north-west section of the foundation an excavation was dug twenty-three feet below the surface and through a bank of solid red and black clay twelve feet in thickness for the purpose of constructing a lowering stage. At this great depth and below the solid twelve-foot mass of clay a dense forest and thick growth of plants were found. The formation of the trees is perfect. They resemble ash, cedar, and poplar, and it has probably been thousands of years since they saw the light of day before. The wonderful sight of a subterranean forest so far below the surface was witnessed by hundreds of people yesterday, and many specimens of the trees and grass were carried away as curiosities. One piece of wood and clump of grass were sent to the White House.—*Washington Republican.*

STEAM *vs.* WATER-POWER.—The minimum capacity and height of fall of some of the leading water-powers of the United States are as follows:—

Holyoke, fifty feet, 17,000 horse-power.
Cohoes, No. 3, one hundred and five feet, 14,000 horse-power.
Lewiston, fifty feet, 11,000 horse-power.
Lowell, thirty-five feet, 10,000 horse-power.
Lawrence, twenty-eight feet, 10,000 horse-power.
Turners Falls, thirty-five feet, 10,000 horse-power.
Manchester, fifty-two feet, 10,000 horse-power.
Paterson, thirty-five feet, 1,100 horse-power.
Passaic, N. J, twenty-two feet, 900 horse-power.
Birmingham, twenty-two feet, 1,000 horse-power.

Fall River, with at least 500,000 more cotton spindles than any other town or city in the United States, is operated wholly by steam-power. Manufacturers have been heard to say that they would not move across the street for the sake of substituting water for steam, considering the irregularity of most water-powers. A more moderate statement is that of the manager of a prominent woollen mill on the sea-board, whom the writer asked if it would not be cheaper to run his mill by steam than by water. The answer was, "For a mill located as mine is, steam is the cheaper. I use half anthracite screenings and half culm coal from Nova Scotia. The average cost of both kinds of fuel landed on our wharf is $3.25 per ton, and at that figure steam is cheaper than water."—*Textile Gazette.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents herementioned together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

287,790. Auxiliary Saw-Handle. — Elias C. Atkins, Indianapolis, Ind.

287,791. Window-Ventilator. — Jonathan Badger, New York, N. Y.

287,802. Elevator. — George W. Clayton, Cleveland, O.

287,809. Screw-Driver.— Washington Devereux, Bloomsburg, Pa.

287,811. Cleaning Sewers. — Jas. T. Dougine, Chicago, Ill.

287,816. Shutter Bower and Fastener. — Jas. V. Fort, Philadelphia, Pa.

287,847. Try-Square and Bevel. — Jacob K. Minich, North Hampton, Ohio.

287,848. Window-Ventilator. —Christine F. Müller, Cologne, Germany.

287,856. Fire-Escape. — William C. Parsels, Ellenville, N. Y.

287,889. Fire-Escape. — Henry Small, Hartford, Conn.

287,898. Apparatus for moistening Air in Buildings. — George D. Bancroft, Springfield, Mass.

287,899. Pipe-Cutter. — Eldridge F. Barnes, New Haven, Conn.

287,906. Window-Shutter. — Charles T. Cochel, Uniontown, Md.

287,910. Fire-Escape. — Jeffrey M. Davis, Youngstown, O.

287,929. Lightning-Rod Coupling. — William Hewitt, London, Ontario, Can.

287,940. Fire-Escape. — Abijah Johnson, Denver, Col.

287,941. Hydraulic Portland Cement. — William Jones, San Francisco, Cal.

287,942. Mineral Painting Process. — Adolph Keim, Munich, Bavaria, Germany.

287,959. Safety-Elevator. — John T. Pine, New York, N. Y.

287,998. Automatic Self-setting Wrench. — Benjamin F. Bennett, Lockport, N. Y.

288,004. Ventilator. — William P. Buchan, Glasgow, County of Lanark, Scotland.

288,028. Door-Check.—Joseph A. Coultaus, Brooklyn, N. Y.

288,041. Self-Closing Hatchway. — Thomas E. Elliott, Norfolk, Va.

288,045-047. Handle for Files and other Tools. — Josiah F. French, Philadelphia, Pa.

288,059. Automatic Fire-Extinguisher. — Chas. L. Horack, Brooklyn, N. Y.

288,072. House. — Frederick W. Lawrence, Brooklyn, N. Y.

288,078. Fire-Escape.—Henry W. Littlefield, Philadelphia, Pa.

288,095. Combined Nut and Pipe Wrench. — Jos. G. Moomy, Erie, Pa.

288,098. Wrench.—Charles H. Myers, Phelps, N. Y.

288,113. Automatic Elevator-Guard. — Robert P. Rankin, Clayton, Ind.

288,117. Fire-Escape. — James Reidy, Pittsfield Mass.

288,122. Fire-Escape. — Charles J. Savitz, Allentown, Pa.

288,131. Fire-Escape. — Joseph B. Smith, North Buffalo, Pa.

288,149. Fire-Escape. — Charles A. Youngman, Louisville, Ky.

288,155. Fire-Escape. — William H. Barnes, Independence, Kan.

288,163. Combined Compasses and Calipers. — George P. Conant, Geneva Lake, Wis.

288,179. Door-Securer. — Christopher Leaming, Newhall, Cal.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Since our last report twenty-six permits have been granted, the more important of which are the following: —

Frederick Keller, 2 two-st'y brick buildings, and two-st'y brick stable in rear, w s Castle St., n of Orleans St.

Jacob Smith, three-st'y brick building, w s Mount St., s of Saratoga St.

McCoy & Sorter, 2 two-st'y brick buildings, n s Windsor Mill Road, e of Gilmor St.

John W. Albaugh, two-st'y brick stable, in rear e s Madison Ave., between Presstman & Bloom Sts.

Otto Brezanger, two-st'y brick building, 24′ x 50′, e s China Alley, s of Hamburg St.

Henry Westphal, 5 two-st'y brick buildings, e s Central Ave., commencing n e cor. Oliver St.

John Fox, 4 three-st'y brick buildings, w s Pennsylvania Ave., n of Pitcher St.

Louis Elmer & Son, two-st'y brick stable and 2 three-st'y back buildings, e s Norris Alley, n of Lanvale St.

John Bien, two-st'y brick stable, e s Madeira Alley, n of McElderry St.

H. O. Wilbur, three-st'y brick building, w s Charles St., between Cross and West Sts.

D. & C. Streett, two-st'y brick stable, n w cor. Forrest and Hiller Sts.

John F. Carter, two st'y brick stable in rear e s Townsend St., between Carey and Calhoun Sts.

Boston.

Building Permits. — *Brick.* — *Boston St.*, near Clapp St., Ward 20, for Thomas Rice, 6 dwells., 20′ x 35′, two-st'y mansard.

Albany St., near East Concord St., Ward 18, for Trustees Homœopathic Hospital, boiler-house and laundry, 43′ x 43′, two-st'y pitch.

Harrison Ave. Ex., near Essex St., Ward 10, for Albert R. Whittier, mercantile, 16′ and 20′ x 56′, one-st'y flat; H. J. Bartlett, owner.

Commercial St., *Nos.* 436 *and* 438, cor. Greenough Ave., Ward 6, for Wm. H. Smith, dwell. and store, 25′ x 45′, four-st'y flat; Thomas R. White, builder.

Wood. — *Athens St.*, *No.* 199, Ward 13, for M. F. Gavin, 2 dwells., 16′ 6″ x 49′, three-st y flat; P. F. Hanlon, builder.

West Eagle St., near Brooks St., Ward 1, for Isaac Pratt, Jr., 2 dwells., 15′ x 17′ and 20′ x 32′, three-st'y flat; Asa Mitchell, builder.

Parker St., *No.* 671, cor. Gurney St., Ward 22, for Sylvester L. Ward, dwell., 26′ x 43′, three-st'y hip; Samuel Rantin, builder.

Forest St., rear, near Adams St., Ward 24, Edwin E. Stetson, greenhouse, 13′ x 81′, one-st'y pitch; Henry Gordon, builder.

North Harvard St., nearly opposite Smith St., Ward 25, for James H. Edwards, dwell. and store, 19′ 6″ x 33′, two-st'y pitch; Northey, builder.

Market St., near Cambridge St., Ward 25, for John W. Gardner, restaurant, 15′ x 25′, one story pitch; Edward Dennison, builder.

Everett St., near Beacon St., Ward 25, for James Dolan, 2 dwells., 18′ x 28′, two-st'y pitch; Chris. Leake, builder.

Sparhawk St., near Sparhawk Ave., Ward 25, for Mrs. Rhoda J. Hatch, dwell., 32′ x 34′, two-st'y hip; Samuel N. Davenport, builder.

Walden St., cor. Arklow St., Ward 22, for Patrick Regan, dwell., 23′ x 33′, two-st'y pitch; Thomas Clure, builder.

Hyde Park Ave., near Neponset St., Ward 23, for Alexander Rogers, dwell., 21′ and 27′ x 30′, two-st'y pitch; Alex. Rogers, builder.

Boylston Ave., near Green St., Ward 23, for John Kelley, dwell., 16′ x 22′ and 21′ x 31′, two-st'y pitch.

Crawford St., near Elm Hill Ave., Ward 21, for H. A. Wood and J. F. Wetherbee, dwell., 28′ x 39′, two-st'y pitch; dwell., 25′ and 28′ x 48′; Wood & Wetherbee, builders.

Hancock St., near Prospect Ave., Ward 23, for Chauncy Hancock and John E. Blakemore, 2 dwells., 20′ and 28′ x 48′, two-st'y pitch; Alexander Rogers, builder.

Green St., cor. Oakdale St., Ward 23, for Thomas Decatur, dwell. and stores, 43′ x 70′, three-st'y flat.

Townsend St., rear, near Walnut Ave., Ward 21, for Mary E. Morse, stable, 31′ x 46′, one-st'y pitch; Valentine Bock, builder.

Allston St., near Sharp St., Ward 24, for Geo. A. Noyes, 2 dwells., 23′ 6″ and 26′ x 36′, two-st'y hip; Noyes Bros., builders.

Selden St., near Milton Ave., Ward 24, for Charles L. Welden, dwell., 24′ 4″ and 29′ 10′ x 32′, two-st'y hip; Charles L. Welden, builder.

Washington St., near Green St., Ward 22, for James Dowling, dwell., 22′ 6″ x 39′ 6″, three-st'y pitch; McDonald & Tobin, builders.

Copeland Pl., *No.* 3, Ward 21, for John M. Way, dwell., 24′ 2″ x 40′, two-st'y pitch; Gilbert & White, builders.

Warren St., cor. Zeigler St., Ward 21, for Amelia Milton Atty, stores, 45′ x 85′, one-st'y flat; Thomas S. Tobin, builder.

Carruth St., cor. Fairfax St., Ward 24, for H. S. Carruth, dwell., 33′ x 34′, two-st'y hip; F. M. Severance, builder.

Coolidge Ave., near Warren Ave., Ward 24, for M. Foster Sweetser, dwell., 27′ 3″ x 45′, two-st'y pitch; John H. Burt & Co., builders.

Warren Ave., near Water St., Ward 5, for Joseph A. Wellington, 2 buildings, storage of coal, 32′ x 115′; Isaac McLean, builder.

Charles River Ave., *Nos.* 39 *and* 41, Ward 5, for Joseph A. Wellington, building, storage of coal, 50′ x 100′; Isaac McLean, builder.

Ruggles St., *No.* 216, near Tremont St., Ward 22, for Mrs. Jas. B. Page, dwell., 19′ x 20′ and 22′ x 32′ three-st'y flat; Valentine Bock, builder.

Longwood Ave., near Bumstead Lane, for James McCormick, stable, 35′ x 58′ 8″, two-st'y flat.

Brooklyn.

Houses. — Three residences, 25′ x 80′, are to be built of brick, with terra-cotta finish, for Mr. Jno. W. Mason, on Hicks St., at a cost of about $80,000, from designs of Mr. M. W. Morris, of New York.

Building Permits. — *Bushwick Ave.*, e s, 60′ n Varet St., 2 three-st'y frame double tenements, tin roofs; cost, each, $4,500; owner, Leopold Michel, Ewen St., cor. Meserole St.; architect, T. Engelhardt.

Hart St., s s, 150′ w Stuyvesant Ave., two-and-one-half-st'y frame tenement, tin roof; cost, $3,500; owner, W. O. Schmitthenner, on premises; architect, F. Engelhardt; builder, Herr.

Evergreen Ave., e s, 20′ n e Himrod St., four buildings, also, *Evergreen Ave.*, w s, 20′ s w Harmon St., four buildings; two-st'y frame tenements, tin roofs; cost, each, $1,500; owners, architects and builders, Cozine & Gascoin, 307 Evergreen Ave.

Evergreen Ave., n e cor. Himrod St., also *Evergreen Ave.*, s w cor. Harmon St., 2 three st'y frame stores and tenements, tin roofs; cost, each, $2,500; owners, etc., same as last.

Nineteenth St., *No.* 145, n s, about 250′ e Third Ave., three-st'y frame double tenement, tin roof; cost, $3,000; owner, Adeline Jacklitsch, 133 Nineteenth St.; architect, W. H. Wirth; builder, J. R. Greene.

Flatbush Ave., n e cor. Park Pl., one-st'y brick store or stores, gravel roofs; cost, $3,500; owner, H. Blattmacher, Park Pl., cor. Carlton Ave.; builder, C. B. Sheldon.

Greene Ave., s s, 225′ w Lewis Ave., 2 three-st'y brick buildings, tin roofs; cost, $6,500; owner, Paul C. Grening, 420 Gates Ave.

Park Ave., *No.* 832, s s, 200′ w Sumner Ave., three-st'y frame double tenement, tin roof; cost, $4,000; owner, Herman Schade, Beaver St.; architect, T. Engelhardt; builder, J. Rueger.

Sackett St., *No.* 326, s s, 250′ w Smith St., five-st'y brick tenement, tin roof; cost, $8,000; owner, H. W. Stearns, 392 Court St.; architect, T. F. Houghton.

Quincy St., n s, 185′ w Throop Ave., 4 two-st'y stone front dwells., tin roofs; cost, each, $4,000; owner and builder, Jas. W. Stewart, 455 Bedford Ave.; architect, M. Walsh.

Norman Ave., s s, 50′ e Guernsey St., 2 three-st'y frame tenements, gravel roofs; cost, each, $2,500; owner and architect, Stephen M. Randall, 572 Lorimer St.; builders, J. and J. Van Riper and owner.

Chicago.

Flats. — H. Rhewoldt, architect, planned the three-st'y double flats to be built on Ohio St., near Clark St.; cost, $23,000.

Houses. — Mrs. E. Lardner will build a two-st'y brick dwell., 22′ x 50′, on Centre Ave.; cost, $6,000; H. Rhewoldt, architect.

B. W. S. Clark has made plans for dwell. on Washington Ave., Hyde Park, for Mrs. Ware.

H. Rhewoldt, architect, has completed plans for three-st'y dwell., for S. Kohn; cost, $7,500; W. Goldie, contractor.

Same architect made the plans for F. Kollman's three-st'y brick dwell.; cost, $12,000; A. A. Stevens & Co., contractors.

H. Rhewoldt is architect for two-st'y brick dwell., for Mrs. E. Klaner; cost, $11,000; Val. Lund, contractor.

Building Permits. — A. Kussman, two-st'y store and dwell., 629 Thirty-first St.; cost; $4,000.

Mrs. V. L. A. Seyer, two-st'y store and dwell., 131 Clybourne Ave.; cost, $3,000; H. Bornhoeft, architect; A. F. Wolf, builder.

J. Wolf, two-st'y store and dwell., 710 Twelfth St.; cost, $3,500; F. Thalman, architect; A. Dressic, builder.

P. L. Auten, three-st'y dwell., 318 South Ashland Ave.; cost, $15,000; architect, L. G. Quackenboss; builders, Geo. Lehman & Co.

Pittsburgh, Cincinnati & St. Louis R. R. Co., freight-depot, Clinton St., cor. Carroll Ave.; cost, $20,000; Geo. Lehman & Co., builders.

B. Loewenthal, four-st'y store, Van Buren St., cor. Canal St.; cost, $15,000.

H. Schmeltekopf, two-st'y dwell., 319 Thirteenth Pl.; cost, $3,500.

E. A. Hess, two-st'y store and dwell., 247 Division St.; cost, $4,500; architect, P. W. Anderson; builder, A. Lindgren.

Echart, Swan & Co., four-st'y flouring-mill, 68 to 72 North Canal St.; cost, $50,000; architect, S. V. Shipman; builder, L. J. Daezling.

P. Kauff, two-st'y stores and dwells., 43 to 47 O'Brion St.; architect, Otto H. Matz; builders, King & Demath.

C. D. Wetherell, 5 two-st'y dwells., 3008 to 3010 Calumet Ave.; cost, $25,000; architect, W. H. Drake; builders, M. P. Seabery & Co.

James C. Gault, 2 three-st'y dwells., 854 and 856 West Washington St; cost, $10,000; architect, W. Zimmerman; builder, S. D. Moore.

E. Olson & Co., 2 three-st'y stores and flats, Cottage Grove Ave.; cost, $10,000; Olson & Co., builders.

S. J. Mix, two-st'y barn, near Polk St.; cost, $5,000; builders, Barney & Rodatz.

A. Chisholm, three-st'y factory, 258 Michigan St.; cost, $8,000; architect, Z. Zarbell; builders, Pratt & Kieterink.

P. F. Weldon, two-st'y dwell., 519 West Taylor St.; cost, $2,600.

P. O. Stensland, three-st'y dwell., 140 Evergreen Ave.; cost, $7,000; architect, C. O. Hauson; builder, J. Olsen.

J. Rogerson, two-st'y dwell., 509 West Monroe St.; cost, $4,000; architect, O. H. Placey; builders, C. Barton & Co.

S. A. & E. F. Newton, four-st'y flats, 121 and 123 Third Ave.; cost, $15,000; architect, J. J. Flanders; builder, Jno. Mountain.

Cincinnati.

Building Permits. — Benjamin Rollman, three-st'y brick building, Flint St., near Denman St.; cost, $3,500.

August Suttlemeier, three-st'y brick building, Eighth St., near State St.; cost, $8,000.

John Clark, two-st'y brick building, Sixth St., near Broadway; cost, $3,500.

Matilda Bunch, two-st'y frame building, Beach St., near Locust St.; cost, $3,500.

John M. Lane, two-st'y frame building, Carlisle St., near Burnet Ave.; cost, $3,500.

Twelve permits for repairs; cost, $5,000.

Total permits to date, 727.

Total cost to date, $2,529,950.

Detroit.

Building Permits. — C. L. Cole, brick house, 48 West Alexandrine Ave.; cost, $6,000.

George Watkins, 2 brick houses, 427 and 429 Third Ave.; cost, $9,000.

Gearing & Co., brick house, 40 Charlotte Ave.; cost, $4,400.

F. Julien & Co., brick store, 335 Franklin St.; cost, $2,700.

Perrin Bros., additions to brick flouring-mill, 236 Gratiot Ave.; cost, $2,500.

New York.

Factory. — A two-st'y brick factory, 52′ x 258′ 4″ is to be built by Mr. Richard Walter, on the cor. of Railroad Ave. and One Hundred and Sixty-sixth St., at a cost of $30,000, from designs of Messrs. Thom & Wilson.

Hotel. — Joseph Fisher, of the Clarendon Hotel, has filed plans in the Buildings Bureau for an eight-st'y hotel on the s e cor. of Broadway and Thirty-eighth St. The plans were drawn by William H. Hume, architect. The estimated cost of the building is $300,000.

Residences. — Ten four-st'y brownstone dwells., and a five-st'y brick and stone apartment-house, the latter 25′ x 98′ 2″, are to be built on the s w cor. of Seventy-third St. and Ninth Ave., at a cost of about

$250,000, by Messrs. Terence Farley & Son, from designs of Messrs. Thom & Wilson.

For Mr. Chas. Kopp, a three-st'y brownstone house, with 20′ front, is to be built on the n s of One Hundred and Thirty-third St., w of Seventh Ave., from designs of Mr. James Barrett.

TABERNACLE.—"The Gospel Tabernacle" is to be the name of the brick church to be built on Thirty-second St., with a wing on Eighth Ave., for the evangelical work of Rev. A. B. Simpson. It will cost $20,000.

BUILDING PERMITS.—*MacDougal St., No.* 116, five-st'y brick tenement, tin roof; cost, $8,000; owner, Daniel McElroy, 154 East Thirty-eighth St.; architect, James Kyle.

West Thirtieth St., No. 360, four-st'y brick dwell.; tin roof; days' work; owner, Mary A. Tinker; architect, C. H. Tinker.

Broadway, s e cor. Thirty-eighth St., eight-st'y brick and brownstone front hotel, iron roof; cost, $300,000; owner, Joseph Fisher, Clarendon Hotel; architect, Wm. H. Hume.

Fifty-eighth St., n s, 200′ w Eighth Ave., one and part one-and-a-half st'y brick club house, tin roof; cost, $7,200; owner, Citizens' Bicycle Club, 2 East Sixtieth St.; architect, Geo. M. Huss; builders, C. Callahan, Grissler & Fausel.

Stebbins Ave., e s, 30′ s One Hundred and Sixty-seventh St., three-st'y and basement frame dwell., tin and shingle roof; cost, $2,996; owner, Lyman Tiffany, 60 Astor House; architect, Henry D. Tiffany; builder, Ed. O'Brien.

Stebbins Ave., e s, 100′ s One Hundred and Sixty-seventh St., three-st'y and basement frame dwell., tin and shingle roof; cost, $2,996; owner, architect and builder, same as last.

Stebbins Ave., e s, 247′ s One Hundred and Sixty-seventh St., three-st'y and basement frame dwell., tin and shingle roof; cost, $2,996; owner, architect and builder, same as last.

Stebbins Ave., e s, 163′ n One Hundred and Sixty-seventh St., three-st'y and basement frame dwell., tin and shingle roof; cost, $2,996; owner, architect and builder, same as last.

Stebbins Ave., e s, 563′ n One Hundred and Sixty-seventh St., three-st'y and basement frame dwell., tin and shingle roof; cost, $2,996; owner, architect and builder, same as last.

One Hundred and Forty-second St., s s, 100′ e Rider Ave., four-st'y frame tenement, gravel roof; cost, $5,000; owner, Mrs. Mary Wilson, 218 West Fourth St.; architect and builder, Geo. T. Campbell, 567 East One Hundred and Forty-third St.

One Hundred and Twenty-fifth St., n s, 400′ w Sixth Ave., 2 two-st'y brick dwells. and stores, tin roofs; cost, about $7,500; owner, John Harney, 277 West One Hundred and Twenty-seventh St.; architect, G. Robinson; builder, John Downey.

First Ave., s w cor. Thirty-ninth St., six-st'y brick factory, slate and tin roof; cost, $50,000; owner, Geo. Ehret, Ninety-second St., between Second and Third Aves.; architects, H. J. Schwarzmann & Co.

Thirty-ninth St., s s, 65′ w First Ave., 2 five-st'y brick tenements, tin roofs; cost, about $14,000; owner and architects, same as last.

West St., Nos. 193 *and* 194, six-st'y brick warehouse, tin roof; cost, $20,000; owners, M. J. & D. F. Mahony, 63 Madison Ave.; architect, Thos. Jackson.

ALTERATIONS.—*Madison Ave., No.* 226, three-st'y brick extension, tin roof; cost, $20,000; owner, Mrs. E. A. Smith, on premises; architect, R. W. Buckley.

Exchange Pl., No. 51, raise one st'y; cost, $5,000; owner, Estate of E. D. Morgan, John T. Terry, exr., 54 Exchange Pl.; builder, Chas. E. Hadden.

Seventh St., No. 198, internal alterations and store front in basement; cost, $3,000; owner, Simon Bing, Jr., 130 East Seventy-fourth St.; architect, Wm. Graul.

Madison Ave., Nos. 612, 614, 616 *and* 618, seven and part eight-st'y brick extension, tin roof; cost, $125,000; owner, Sarah E. L. Taylor, Hotel Branting, architect, James H. Giles.

New Church St., Nos. 58, 60, 62, 64 *and* 66, No. 58 to be raised one-st'y, and a six and part seven st'y extension in rear, fire-proof block roof; cost, $250,000; owner, Am. Bank Note Co., A. G. Goodall, President, 142 Broadway; architects, J. C. Cady & Co.; builders, Sinclair & Wills and E. Snedecker.

Philadelphia.

BUILDING PERMITS.—*Twelfth St.*, n of Columbia Ave., ice-house, 52′ x 65′; Chas. Glass, owner.

Jasper St., cor. Somerset St., addition to ice-house, 23′ x 46′; Jno. Cunningham, contractor.

Frankford Ave., cor. Westmoreland St., one-st'y addition to dry-house, 30′ x 40′; Jno. Cunningham, contractor.

Venango St., e of Marshall St., 5 two-st'y dwells., 16′ x 28′; F. Shoemaker, owner.

Marshall St., s of Venango St., 5 two-st'y dwells., 14′ x 28′; F. Shoemaker, owner.

Gray's Ferry Road, cor. Thirty-fifth St., four-st'y paint-factory, 50′ x 107′; Harrison Bros. & Co.

Herman St., No. 53, three-st'y dwell., 18′ x 46′; Geo. A. Sorber, owner.

Eighteenth St., n of Wharton St., 3 two-st'y dwells., 15′ x 39′; J. A. McGucken, contractor.

Allegheny St., w of Frankford Ave., three-st'y dwell., 18′ x 45′; W. H. Ewing, owner.

Frankford Ave., No. 2829, two-st'y dwell., 19′ x 53′; C. R. Shoemaker, owner.

McClellan St., No. 625, two-st'y dwell., 13′ x 30′; J. S. Baldt & Son.

North Twenty-seventh St., No. 1606, two st'y store and dwell., 18′ x 30′; E. Schmidt, contractor.

Fairhill St., s of Lehigh Ave., two-st'y dwell., 20′ x 20′; Geo. Grantz, owner.

Delhi St., s of Dauphin St., two-st'y dwell., 16′ x 45′; Chas. O. Kronglowicz, owner.

Twenty-seventh St., s of Clarence St., 2 two-st'y dwells., 13′ x 30′; J. H. Post, owner.

Snyder Ave., w of Seventh St., three-st'y factory, 75′ x 110′; A. M. Greene, owner.

Montgomery St., e of Twenty-third St., 9 three-st'y dwells., 16′ x 50′; Jno. S. Serrill, owner.

Norris St., w of Richmond St., two-st'y planing-mill, 80′ x 90′, and two-st'y stable, 27′ x 31′; Jesse W. Taylor & Sons, owners.

Gordon St., e of Cedar St., shop, 18′ x 49′; H. W. Butterworth, owner.

Eighteenth St., cor. Berks St., 8 three-st'y dwells., 17′ x 60′; J. L. Kates, owner.

Nineteenth St., e s, below Wharton, two-st'y dwell., 16′ x 38′; T. C. O'Rourk, owner.

Third St., n of Huntingdon St., two-st'y smith-shop, 16′ x 45′; M. Branigan, owner.

E St., s of Indiana Ave., two-st'y dwell., 17′ x 44′; J. C. Stackhouse, contractor.

Boynton Lane, s of Wistar St., 2 two-st'y dwells., 16′ x 47′; Jno. Rufe, owner.

North Forty-second St., No. 318, two-st'y dwell., 17′ x 44′; Lewis Smith, contractor.

Sigel St., w of Ninth St., 9 two-st'y dwells., 15′ x 28′; M. McManus, owner.

St. Louis.

BUILDING PERMITS.—Fifty-three permits have been issued since our last report, fourteen of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows:—

Thomas Gugerty, 2 two-st'y brick dwells.; cost, $4,000 each; Thomas Gugerty, contractor.

T. R. Peters, 2 two-st'y brick dwells.; cost, $4,500; A. H. Hageman, contractor.

Chas. Tacke, two-st'y brick dwell.; cost, $5,000; Volke & Tacke, contractors.

L. Gruensfelder, two-st'y brick ice-house; cost, $3,000; Fred Beck, contractor.

Mrs. Schroeder, two-st'y brick dwell.; cost, $2,700; A. Beinke, architect; A. Fennar, contractor.

Laclede Car Manufacturing Co., two-st'y brick car-shop; cost, $2,900; J. I. Wharton, contractor.

C. Von der Ahe, 2 adjacent two-st'y brick dwells.; cost, $7,000; A. Beinke, architect; contract sub-let.

C. Von der Ahe, 2 adjacent two-st'y brick dwells.; cost, $7,000; A. Beinke, architect; contract sub-let.

A. Beinke, 2 adjacent two-st'y brick dwells.; cost, $5,000; A. Beinke, architect; contract sub-let.

C. Jeuhne, two-st'y brick dwell.; cost, $2,800; J. B. Legg, architect; R. F. Parks, contractor.

Washington, D. C.

BUILDING PERMITS.—*Seventeenth St.*, between R and S Sts., three-st'y brick dwell. for W. A. Stewart; cost, $3,500.

W St., between Thirteenth and Fourteenth Sts., n w, two-st'y brick dwell., for A. M. Cowell; cost, $3,500; C. C. Martin, builder.

Stoddert St., West Washington, two-st'y brick dwell. for Mrs. R. B. Tenney; cost, $3,500; Columbus Thomas, builder.

Q St., between Fifteenth and Sixteenth Sts., n w, three-st'y brick dwell., for Jno. P. Lawrence; cost, $7,000; F. F. Schneider, architect; W. P. Liscombe, builder.

Q St., between Seventh and Eighth Sts., n w, one-st'y brick church, for St. James Congregation; cost, $9,000; Henry Congdon, architect.

N St., between Eleventh and Twelfth Sts., n w, 2 two-st'y brick dwells., for N. T. Haller and D. L. Morrison; cost, $9,000; N. T. Haller, builder.

A St., between Seventh and Eighth Sts., n e, two-st'y brick dwell., for J. D. Marx; cost, $3,000.

P St., between Seventeenth and Eighteenth Sts., n w, 4 three-st'y brick dwells., for F. R. Winsor; cost, $28,000.

Sixteenth St., above Rhode Island Ave., three-st'y brick dwell., for J. F. Rodgers; cost, $16,500; Kenderdine & Paret, builders.

General Notes.

BRIDGEPORT, CONN.—Swedish Baptist church, frame, 40′ x 70′; cost, $2,500; Palliser, Palliser & Co., architects.

Block of six brick houses, for Clark Marsh, Esq., cor. East Washington Ave. and William St.; cost, $15,000; Palliser, Palliser & Co., architects.

CHESTER, PA.—Morris Hammill is building a new carriage manufactory, cor. Fifth St. and Concord Ave.

EAST RINDGE, N. H.—Jones M. Wilder is building a large house.

GLEN RIDGE, N. J.—For Mr. Chas. E. Breeden, a $6,500 cottage is to be built from designs of Mr. Chas. D. Marvin, of New York.

HOLYOKE, MASS.—The Whiting Paper Company is to build an addition to No. 1 mill, 50′ x 122′, four stories high above the basement.

JEWETT CITY, CONN.—John F. Slater, of Norwich, Conn., is about to erect a stone building for a public library, from designs of Stephen C. Earle, architect, of Worcester, Mass.

LEBANON, N. H.—The Grand Army men and others are actively at work to raise funds for a memorial hall building in this town.

LEE, MASS.—The Decker Paper Mill, burned a few days since, will be rebuilt, and will be 100′ long and three stories high.

NORTH CONWAY, N. H.—A wooden church, for the Congregational Society, is to be built by Mead, Mason & Co., of Boston, contractors, from drawings by Stephen C. Earle, of Worcester, architect; cost, about $7,000.

STONINGTON, CONN.—Mrs. Potter will have a cottage built here at once, from plans by Palliser, Palliser & Co., architects, Bridgeport, Conn.; cost, $5,000.

WORCESTER, MASS.—C. A. Vaughan has taken the contract for building a frame church for the Swedish M. E. Church Society at Quinsigamond Village; cost, about $5,000; Stephen C. Earle, of Worcester, architect.

Bids and Contracts.

BOSTON, MASS.—The contract for encaustic tiling for the post-office and sub-treasury has been awarded to the American Encaustic Tiling Co., $700; and marble tiling for second, third and fourth stories to Davidson & Sons, $5,095.24.

The contract for marble wainscoting, mantels and hearths for the post-office and court-house has been awarded to C. E. Hall & Co., at their bid of $5,345.

BUFFALO, N. Y.—The following is a synopsis of bids for iron beams, etc., required for the first floor of the extension of the custom-house and post-office, opened November 5, 1883:—

Niagara Bridge Company, $996 (*accepted*).
C. H. Kellogg, $1,064.
Asa Snyder, $1,220.
Blake & Duffy, $1,269.92.
Phœnix Iron Company, $1,380.07.
Haugh, Ketcham & Co., $1,383.34.
T. H. Brooks, $1,094.69.

CHARLESTON, W. VA.—The following is a synopsis of bids for stone and brickwork for approaches for the post-office, court-house, etc.:—

Middleton, Lane & Co., posts, stops and blocks, $1,015; street curbing, $630; brick sidewalks, $96.

William D. Isaacs, posts, stops and blocks, $630; street curbing, $170; brick sidewalks, $130; grading lot, and for roadway, gutter and walks, $2,000; sodding, per superficial yard, 60 c. (*accepted.*)

M. V. Smith & O'Brien, posts, stops and blocks, $710; street curbing, $159.30; brick sidewalks, $143; grading lot, and for roadway, gutter, and walks, $2,200; sodding, per superficial yard, 50 c.

Oman & Stewart, posts, stops and blocks, $1,462; including street curbing and brick sidewalks.

KANSAS CITY, MO.—The contract for slating the roofs of the court-house and post-office has been awarded to T. F. and J. A. Hayden, of St. Louis, the lowest bidders ($1,950).

NEW YORK, N. Y.—The contract for plastering the new building of the Mutual Life Insurance Co., on Nassau St., has been awarded to the Wight Fire-proofing Co., of Chicago.

MONTGOMERY, ALA.—The contract for furnishing heating-apparatus for the court-house, etc., has been awarded to Bartlett, Hayward & Co., at their bid of $7,848.

SANDUSKY, O.—The contract for furnishing the heating-apparatus for the custom-house has been awarded to Samuel I. Pope & Co., Chicago, Ill., the lowest bidders.

TOPEKA, KAN.—The Wight Fire-proofing Co., of Chicago, has secured at $12,000, the contract for fireproofing the new general office of the A. T. & S. F. R. R.

The following is a synopsis of the bids for glass for the court-house and post-office:—

Crystal Plate-Glass Company, $2,050.

E. A. Boyd & Son, foreign glass, $2,217.94 without duty; 2,520.09 with duty.

De Pouw Glass Works, $2,494.
Healy & Millet, $2,406.25.
H. Madden, $3,038.66.
William Glenny, $3,200.

The contract has been awarded to the Crystal Plate-Glass Company, of St. Louis, at their bid of $2,050.

COMPETITION.

MONUMENT.

[At Milwaukee, Wis.]

The committee in charge is now prepared to receive designs and proposals for the erection of a granite monument on the lot in Forest Home Cemetery, in memory of the victims of the Newhall House Fire. The cost of the monument must not exceed $3,000, including the lettering on the monument of the names of the victims.

The foundation will be laid even with the surface of the ground, at the expense of the committee.

The monument is to be erected as early as possible in the season of 1884, and designs and proposals should be sent in **not later than the first day of January, 1884.**

The committee reserves the right to reject any or all of the designs or proposals submitted.

Proposals may be sent to, or any further information obtained from,

WM. P. McLAREN.
414 Chairman Committee, Milwaukee, Wis.

PROPOSALS.

STONE AND BRICK WORK.

[At Peoria, Ill.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., November 7, 1883.

Sealed proposals will be received at this office **until 12 M., on the 28th day of November, 1883,** for furnishing the labor and material, stone, bricks, mortar, etc., and building complete, the basement and area walls of post-office, court-house, etc., at Peoria, Ill., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

JAS. G. HILL,
412 Supervising Architect.

MANTEL TILES AND FRAMES.

[At Boston, Mass.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., November 7, 1883.

Sealed proposals will be received at this office **until 12 M., on the 21st day of November, 1883,** for supplying and delivering at the post-office and sub-treasury extension at Boston, Mass., all the "Low's" tiles and brass frames required for mantels, in accordance with drawings, specification and schedules, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

JAS. G. HILL,
412 Supervising Architect.

STEAM-HEATING.

[At Spencer, Mass.]

The Building Committee of the town of Spencer solicits sealed proposals for furnishing and setting steam-heating apparatus in four school-houses: one of six rooms, and three of four rooms each.

Proposals must specify the size and kind of boilers, length and size of pipes and radiators, and be accompanied by a diagram showing the location of each.

Bids will be opened **Friday, November 23, at 7.30 P. M.**

The Committee reserves the right to reject any or all bids, as may seem for the best interest of the town.

Proposals should be marked "Proposals for Steam-Heating," and be addressed to E. E. STONE, Chairman, Spencer, Mass. 412

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

ALTHOUGH no official report has been received from the Commission charged with the duty of inquiring into the cause of the catastrophe at Madison, Wisconsin, it is understood that the evidence points to defects in the iron columns as the primary source of weakness in the structure. Although sound in appearance when brought on the ground, the columns are said to have shown themselves, when fractured by the crash, full of air-bubbles and scoriæ, while the thickness proved to be much less than that called for in the specification. So far as the plans are concerned, the Commission finds nothing to criticise seriously, and will, it is said, exonerate the architects of all responsibility for the disaster, and will also, probably, relieve the builders from blame. For some reason, one or two of the journals which comment on the matter seem to think that if neither the architects nor the builders are to be made accountable for the consequences of the calamity the State will be forced to assume them. This idea appears to us quite erroneous. If the iron-founder who made the columns was a contractor with the State, or a sub-contractor under a principal contractor, and not employed by the State as its salaried agent, he is, if the fatal weakness is shown to have been in his work, accountable, to the last dollar of his property, for the reimbursement of the State's loss, and the payment of proper compensation to the families of the men who were killed or injured through his fault. If he was a principal contractor, he would be, as we suppose, alone responsible; but if, as we understand to have been the case, he was a sub-contractor only, we cannot see why his principal is not held equally with himself. Under the French law, if the fall of the building had been due to defects which could have been detected by the architect, the latter would be made jointly responsible with the man whose bad work he failed to condemn, although he would be regarded only as a secondary, not a principal offender, and the contractor's property would have to be first exhausted in paying compensation for the damage caused, before any demand could be made upon that of the architect. In such a case as this, however, it is very doubtful whether any tests within the reach of the architect would have shown the dangerous inferiority of the castings. The common method, of ringing the iron with a hammer, would show the existence of an indefinite number of air-bubbles, but the factor of safety usually allowed for cast-iron columns is so large that a small amount of imperfection might pass without making it necessary to reject the column, and the hammer test would not show the extent of the defect.

WE regret exceedingly to learn of the sudden death of a well-known and very highly esteemed architect of New York, Mr. Henry Fernbach, who, like the lamented Mr. Sims of Philadelphia, a year ago, while at work in his office suddenly fell, and expired in a few minutes. Mr. Fernbach was born in 1828 in Breslau, Germany, and graduated at the Building Academy in Berlin, coming to this country in 1855, immediately after his graduation. After some years spent as an assistant to various architects, he began business for himself, and gained very considerable distinction, being entrusted with the construction of the Germania Savings Bank, the *Staats-Zeitung* Building, the Hebrew Orphan Asylum in Seventy-seventh Street, and if we are not mistaken, of the beautiful synagogue in Fortieth Street. He was chosen early in his career a member of the American Institute of Architects, and took much pleasure in promoting its interests, as well as those of the Chapter to which he belonged. Although naturally of a rather quiet and retiring disposition, he was recognized in the profession as a thorough master of his art, and a friendly and trustworthy associate. The American Institute of Architects, in particular, which owes to him, and to the others like him, who formed its strength in its earlier days, that tradition of dignity and self-respect which has done so much for its influence, will place his name among those to be preserved in the most honored remembrance.

MOST architects, even in this country, are more or less familiar with the London *Builder*, and will be interested to learn of the retirement of its distinguished editor from the control of what has been for many years the most influential of the professional journals. Both as a writer on architectural matters, and as an architect, the retiring editor, Mr. George Godwin, has been prominently before the public, both in England and elsewhere, for fifty years. His first professional training was received in the office of his father, who was also an architect, and although taken early from school to devote himself to practical work, his untiring industry supplied the place of other teaching, and he soon became prominent among the students of his time. While still a pupil, his attention was attracted by the offer of a prize for the best essay on concrete, to be judged by a committee of the Royal Institute of British Architects, and he undertook a thorough study of the subject, collecting the information thus gained into an essay which not only won for him the first prize, but received the still greater honor of immediate translation and publication in France, Germany and Italy.

LIKE most people of active mind, he took pleasure in communicating his ideas to others, and his skill in writing increasing with practice, he was drawn into an amount of literary work which few members of the profession think of attempting. His devotion to art of other kinds remained, however, undiminished, and he was one of the most earnest promoters of the effort which resulted in the establishment of the Art-Union of London, acting as the Secretary of the association for many years, and devoting much of his time and means to its aid in the earlier and more precarious stages of its existence. During this period he was also constantly engaged in more strictly professional work, winning the first premium in the competition for the great Colney Hatch Lunatic Asylum, and constructing several important churches and schools, besides many private buildings. While still very young, his attention was drawn to the beauty and interest of many ancient ecclesiastical buildings in London, and he began the important work, which, published some years later under the name of the "Churches of London," is still a standard book of reference, and an admirable example of the way in which such subjects should be treated. In recognition of the merit of this and his other works, he was elected a Fellow of the Royal Society, and a Fellow of the Society of Antiquaries, as well as of the Royal Institute of British Architects, and a few months later the Société Libre des Beaux-Arts of Paris awarded him its gold medal. In 1844 he became the editor of the *Builder*, then just entering upon its third year, and for forty years conducted it with unvarying regard to the best interests of the profession of architecture and the allied arts, as well as with admirable intelligence and success. In the moments of leisure which his duties as editor of this journal left him, he still found time to design and execute many buildings, and among other commissions, was employed by the great actor, Kean, to prepare drawings for the scenery of the plays of "Macbeth," the "Winter's Tale," "Richard Third," and "Henry Eighth," which Kean desired to represent with all possible artistic advantages. Even these

occupations did not absorb all his attention, and he continued to publish at intervals essays and books upon professional topics; his graver thoughts recurring frequently to the sad theme of the distress and misery which afflict the poorer half of London. Upon this subject he wrote and studied much, with what practical earnestness those who remember the interest which the *Builder* has always shown in the improvement of dwellings for the working classes can understand. Judging from the lives of other men who have impressed themselves upon their time, it would hardly be surprising if the well-earned leisure of Mr. Godwin's later years, of which many, we hope, still remain to him, should be devoted to the most fruitful of all his efforts for the good of his fellow-men; if not, we may be certain that only physical infirmity has been able to overpower the zeal which his matured wisdom would have directed so effectively.

LA SEMAINE DES CONSTRUCTEURS gives its opinion in a recent number upon a question which will interest a great many people besides its own readers. A letter to the editor relates that the writer, a clerk in the office of his father, who is a mason and builder, was asked by a thrifty individual to make plans for a building which he thought of erecting. The clerk made the plans and took them to the proprietor, who found them satisfactory, and desired that specifications should be drawn up, and the whole submitted for estimate to such contractors as the clerk might select. This was done, but on comparing the estimates it was found that the total estimate exceeded the limit of cost which the proprietor had contemplated; and the plans were modified to lessen the expense. The remodelled drawings had been made nearly satisfactory to the proprietor, and a final consultation was held between him and the designer, at the close of which he requested the latter to lend him tracings of the plans, in order that he might consider them a little further by himself. The clerk unsuspiciously did as requested, whereupon the proprietor had the drawings traced, and sending back the originals with an insulting letter, proceeded to submit his stolen copies to another contractor for estimate, saying that the plan had been made by "one of his friends." The second contractor happened to be a relative of the clerk, and learning the circumstances, or recognizing the plan, took the liberty of putting the tracings in a place of safety, for restoration to the rightful owner.

THE inquiry which the clerk makes of the editor of *La Semaine* is, whether he can collect payment for his work on the plans and specifications, and if so, at what rate? The reply is, it must be acknowledged, anything but encouraging to persons who desire to combine in themselves the functions of architect and contractor. In the editor's opinion, a proprietor who requests an architect to prepare plans for him implies in that request a promise to pay him the customary compensation for his trouble; and the architect, like the member of any other profession, has only to prove employment in his professional work to recover the usual remuneration. With a builder's clerk the case is very different. His business is not to make designs, but to help his employer in securing and executing contracts; and neither the proprietor nor other persons would ordinarily see, in the fact of his preparing plans and specifications for a building, anything more than an effort on the builder's part to make sure of a contract which he might lose in the chances of competition if an architect were employed in the usual way. That this would be the ordinary understanding in such a case, in default of any agreement or stipulation to the contrary, is shown, as the editor thinks, by the simple consideration that no one, if it were customary to pay architects' fees to builders' clerks for such work, would choose the inexpert and irresponsible service of the latter in preference to the educated taste and skill, and greater pecuniary responsibility of the professional man. The editor is further of opinion that the preparation of plans and specifications by a builder's subordinate not only does not entitle the latter or his employer to compensation, but furnishes no ground for claiming a preference in the award of the contract; the understanding in such cases being, as he thinks, that the plans are made simply as an inducement to the proprietor to enter into the contract for their execution. They may accomplish their object, if the builder is fortunate, but if not, he is only entitled to his labor for his pains.

AS showing the tendency in all civilized countries toward the development of practical, or, as it might be called, active education, as distinguished from mere passive mental acquirement, it is interesting to note the increasing number and almost invariable success of well-managed technical schools. One of the most recently established, which possesses also a special interest for architects, on account of the subjects to which it is exclusively devoted, is a school of building construction and mill-engineering, at Neustadt, in Northern Germany, which opened in April, 1882, with seven students. At the beginning of the winter term in the same year the number of students had grown to thirty-six, and the term which has just commenced, less than eighteen months from the opening of the school, finds the attendance increased to seventy. This remarkable prosperity certainly indicates that the school in question, the only one of the kind, so far as we know, which restricts its instruction to so narrow a field of science, meets a want widely felt, and the suggestion is worth keeping in mind by those interested in technical education in our own country.

THE *Deutsche Bauzeitung* gives a fragmentary table, showing the length of telegraph lines in the principal countries of the Continent of Europe, and giving also the number of subterranean lines in each. The latter detail will surprise some of those who have been led to imagine that overhead lines were exceptional in Europe. As might be supposed, the German Empire heads the list, with a total length of lines amounting to about one hundred and sixty-two thousand miles, of which about twenty-three thousand are underground. Russia comes next, with about one hundred and thirty-nine thousand miles of wire, of which only one hundred and fifty-five miles are below the surface; and France is third, with one hundred and thirty-one thousand miles of line, of which seventy-two hundred are underground. Austria and Hungary have ninety-two thousand miles of telegraph, including three hundred and fifty-four miles of subterranean line; and Italy has about fifty-six thousand miles, all, apparently, being overhead lines. In North Germany there is one telegraph station to every four thousand three hundred and eighty-eight inhabitants. France has one to six thousand four hundred and forty-two inhabitants; Austria, one to eight thousand five hundred and thirty-four, and Russia one to twenty-seven thousand and ninety-one. There is something astonishing to us, employing electrical communication so freely as we do, in the idea of twenty-seven thousand people finding a single telegraph station sufficient for their needs; but we cannot judge by our habits of those which prevail among peasants and serfs. It is a pity that the statistics for Switzerland were not given. Although the length of lines in that small country would be inconsiderable, there is perhaps no rural community which makes more use of the admirable telegraphic service provided by the public authority.

THE *Scientific American* publishes some observations upon the use of cast-steel in place of heavy forgings of wrought-iron, which seem to indicate that the steel, properly made, is superior in most respects to the iron, being more uniform in substance, where large masses are used, as well as stronger. The most serious danger with cast-steel in heavy blocks, as with cast-iron, arises from possible inequality of cooling, which is liable to produce internal strains, like those which so often destroy badly designed iron castings, and it is necessary to lessen such strains by annealing. The ordinary process of annealing consists in heating the completed casting again to light redness, and after maintaining it for a certain time at a high temperature, allowing it to cool slowly. This operation, by actual test, considerably increases the ductility as well as the tensile strength of the steel, in addition to its effect in equalizing internal strains. One French manufacturer of large steel castings, after annealing tempers the work in oil, and finds that this process, especially if repeated, adds still more to the strength and ductility of the metal. It is to be hoped that the use of cast-steel will before long be extended to architectural work. In the form of lintels, for instance, such as are used over small openings in brick walls, the substitution of steel for cast-iron would not only very much diminish the weight of the pieces, but would offer much greater security, while steel-rolled beams would be as much superior for floors and roofs as for railway purposes.

SPANISH ARCHITECTURE.[1] — IV.

GRANADA.

"YOU are going to Granada! Ah! then you will have the delight of seeing the snow mountains and the Alhambra." A vivacious daughter of Andalusia thus betrayed her envy of the pleasant prospect before me as I started on another journey; and when I replied "Yes, the Alhambra and the snow mountains," I reflected upon our different anticipations indicated by that order of enumeration of the two great attractions. In the semi-tropical climate of the Southern lands of Spain — the "*tierras calientes*," as the inhabitants call them — the cool bright snows are luxuries of the first value, whether spread for the enjoyment of the sense of vision upon distant peaks, or broken into drinking cups in the arid streets of cities far below. I appreciated the preference, but I had seen snow in abundance elsewhere; while there is but one Alhambra, and that I knew only by copies and representations whose excellence only stimulated further the desire to see the wondrous original. I never approached a place with greater expectation and happily never found the realization of my hopes more real and satisfying. In these days of abundant information, — of pictures and descriptions and photographs, — the traveller soon learns that realities rarely agree with previous conceptions, for these, derived from the impressions of others (generally too, the most enthusiastic among others) and heightened by his own sanguine interpretation of them, often come face to face with a fact which is in itself very different, or, it may be, is discovered under such unfavorable circumstance and aspect that disappointment results. Still, as I found myself, at last, really on the journey — one day's journey — to Granada my hopes ran high. I revelled in visions of Moorish splendor as the train rattled through the monotonous groves of olives, till their miles and miles of provoking regular rows exhausted the patience of the retina, and ceased to be reposeful. I think there is scarcely anything more irritating than the long continuation of these uniform vistas, speeding back out of sight only to make way for exactly similar things. Eventually the last of them was left behind, and the bases and spurs of the great Sierras broke into the path of our railway and offered it many an engineering problem. There is interest in a journey among crags and precipices, even if made by steam. The train itself acquires a little grace of movement in winding along this inclined path of curves and doubles as changeful as the track of an idle skater. And that day the sunlight was living and lavish of color, so that the gray rocks, bare and crumbling, appeared almost as rich as the flower-dotted turf, and the ploughed soil (where occasionally that operation was practicable) lay in reds and browns and yellows, like tints on a giant painter's palette.

There are pleasurable sensations, too, in listening to the laborious breath of the iron horse as he surmounts the newly conquered fastnesses of nature; and more, when with brakes hard drawn, hissing and creaking and with steam rushing unworked through the safety-valves we thunder down a declivity into a torrent-worn valley. So, upward at one time, and downward at another, gaining a little elevation at each alternation, we get fairly into the mountains, and presently turn a beetling cliff, and suddenly stop at a station — Loja. It is a lovely situation at any time, and now, in the magnificent glow of the sunset, the verdant little valley seems almost ideal. And the ancient village with buildings and inhabitants rivalling each other in old-time picturesqueness, provokes another of those wishes to change the programme and stay here a day or two. One can understand, overlooking this scene, how in old days villages, and even cities, existed and grew, apart from the rest of the world. In such places as this — a little Eden walled in with inaccessible precipices and toilsome wildernesses of rock — strong inducements were required to move an inhabitant. Darkness closed in as we hurried away up the valley and Granada was reached in the night.

After all, I did see and delight in the "snow mountains" first; for in the early morning I opened my window to the bracing wind, and looked upon that landscape which called forth such poetic praise from the Arabic historians, the Vega — garden of the world — that land of delights for the loss of which Boabdil wept. The hill where he stood and gazed for the last time upon it is still known as that of "El ultimo suspiro del Moro." There, it is said, the mother of the vanquished king tauntingly exclaimed, "Thou dost well to weep like a woman for that which thou hast not defended like a man." A little later Charles V, upon beholding the charming landscape, said "Ill-fated the man who lost all this." Now it lay, beautiful as ever, before me; the plain in the fresh bright greenness of spring spreading far away to the uplands in the southeast, there to rise and burst into peaks of jagged rock scraping the great clouds. And when these crept up and back like a curtain drawn from before a picture plains and summits of gleaming white seemed to approach from their distance, and stand nearer than the groves below. These Sierras are not very abrupt or precipitous, but rise in superb slopes of white, broad-sweeping snow-fields, whose perspectives are lost in the skies upon such a day as this, when they are as beautiful, in another way, as the steep Alps of Switzerland.

And then the Alhambra! The first view of it was a charming surprise. We have all heard of the graceful lace-like arches, and delicate columns, and intricate ceilings which help to make up the interior. I knew a little of what to expect there; but I was utterly unprepared for the grand dignified beauty of the outer walls and towers. A steep rough hill which looks as if it had disengaged itself from the buildings of the city by its own will, rises at one side of the main street delightfully clothed with tall-stemmed elms and cherry-trees, just now so lightly foliated with their earliest brilliant leaves that they decorate without hiding the rocks and buildings. Here and there a tiny stream or a noisy brook big enough to turn a mill hurries down the declivities and joins the Darro River below, and on this hill, spread along the uneven edge of the broad top, is the Alhambra of battlements and towers, noble in massive proportions, beautiful with the colors of the warm red stone which gives the name to the fortress, overlaid with the indescribable tints and bloom of age and vegetation. It is as irregular, taken as a whole, as painter could desire. Stretches of timeworn walls of varying heights, with, at one angle a broad low tower of circular form; at another, one totally different, square and lofty; and again, farther east, the great massy "Torre de Comares" which contains the famed "Hall of the Embassadors." Yet no sign of the elaborate beauties of the hall show on this outer face of the tower, unless the windows with their regularity and fine proportion may be so considered. Even these appear small and fortress-like in conjunction with the breadth of walling they stand in; for the ten feet of wall, enclosing as it does a large chamber within, is so much larger without, that the comparative proportions of the arched openings are changed and a different character given them. It is quite a long walk all around these splendid old walls, since the hill which they cover is more than half a mile long and an eighth of a mile wide, and although that part immediately above the Darro, and the opposite face overlooking the lower part of the city, are the most picturesque, there is in every part some tower or other object of interesting aspect, and a new group of rock and building and tree which deserves a sketch. The south side is laid out in steep terraced roads on the slope of the hill through what is called the Garden of the Alhambra — a grove of tall trees refreshed by many a rill and fountain — by which one arrives at the principal entrance, the beautiful old "Puerta de la Justicia" with its emblematic "open hand" and key carved over the horseshoe arches. Just below it stands, with its back to the retaining-wall of the roadway, a fountain of poor Renaissance design, an intruder, but a little more tolerable than usual, since it has become water-stained and mossgrown so that it seems to belong to the gardens and walks rather than to the older edifices. Within the gate, reached by such a doubled and covered way as the ancient warriors knew would be difficult indeed for an assailant, is a broad open "plaza" with rather an incongruous appearance. Among the Moorish walls, many of them in dilapidated ruins, there are some of those disagreeable bits of Spanish works of stucco and wood which I have grumbled at before. There is the citadel with magnificent views from its bastions and notably from the "Torre de la Vela," and there is the large palace which Charles V began but did not finish, standing with its bare roofless walls where formerly some of the finest Moorish chambers were. In another place it might deserve a little consideration, for some of its "Bramante" classic features and sculpture are good examples of their kind, but one cannot but regret that it is here. Behind the palace is found a door where, upon entering, the whole place changes its character and aspect. So far I had been delighted with a grim old fortification, strong, but unadorned except by nature. Here I stepped into a fairy palace, ancient looking still, but even in old age looking like the abode of such creatures as we loved to imagine made the beautiful frost ferns on the window-panes. Perhaps the effect is partly due to age. It may be that time effaces somewhat the more apparent human origin of newer work. I had seen good drawings and models of these decorations: at the Crystal Palace at London is a faithful reproduction of one of the finest courts and I had studied that; but the original was as new to me and as surprising as if I had no previous thought of it, and although I may as well confess to more enthusiastic admiration of these works than some critics award them, yet I observed in all who were competent to form an opinion, the same surprise — the same evidences that the fact surpassed their expectations. It is hard to account for. I do not think it arises from the artistic beauty of the palace *per se*, but from that in connection with the stirring histories and enchanting romance and the other multitudinous associations which blend their attractive values with those of the stones and handiwork they have grown upon. Theoretically, this court, or that chamber, ought to be as beautiful in Boston as in Granada, yet I can realize that it would not possess all the charm, and therefore, while I speak of these relics in the extreme of appreciation it is with the consciousness that it is only in this place that their fullest expression is possible. Probably the maximum of architectural beauty is only attainable when it is expressive of the history or circumstances of its own locality, and it is almost as sure that the highest enjoyment of it is only reached by a proper understanding of those circumstances. If these propositions be true (and experience supports them) they are sufficient to explain some of the disappointments of ambitious architects. Nevertheless, it may be

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[1] By Robert W. Gibson, Travelling Student of the Royal Academy. Continued from page 220, No. 411.

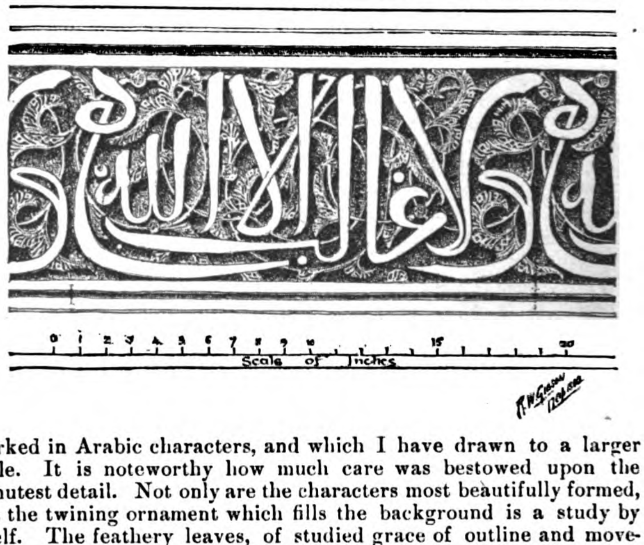
well to end this digression by recalling the spirit of adaptation of the Mudejar style and so avoid a misinterpretation of the above which might make it mean that *none* of such exotic beauties can be translated. The Moorish palace within the Alhambra as it is now seen covers only a very small proportion of the total area, and although I cannot pretend here to give a description in any sense complete, still, to make what follows intelligible some notes of the arrangement are necessary. By the insignificant door at present used as the public entrance *a* (the letters refer to the accompanying sketch-plan) one reaches the Court of the Fish-pond, *b*. On the left, *c* is the fine Hall of the Embassadors within the Tower of Comares; near it at *d* is the Mezquita with its interesting court. Crossing the Court of the Fish-pond an arcaded vestibule leads to the renowned Court of the Lions, *e*; on the left, *f*, is the Hall of the Two Sisters, and opposite it the Hall of the Abencerrages, *g*, and at the end of the court the so-called Hall of Justice, *h*. Now, going through the Hall of The Two Sisters and passing the alcove said to have been the boudoir of the sultana, *j*, we overlook the garden of Lindaraja, *k*, beautiful with flowers and oranges even now. At *l* are the Moorish baths, and thence a corridor commanding magnificent views leads to a little chamber, *m*, mistakenly called the Queen's Dressing-Room. It is more like an observatory.

These courts and halls, and their numerous vestibules, and alcoves, and arcades constitute the chief attractions of the palace, although many other buildings are included in the Alhambra. I wandered through the labyrinth again and again until I began to know something of its shapes and locations, and each time I came into each part the impression grew more powerful upon me. A day or two was passed in this enjoyment before I felt familiar enough to sit down in one spot, and sketch with the concentrated attention such work enforces. It seemed better and more profitable at first to watch and compare. I say watch because some parts appeared to change their expression, under varying lights, like animated nature. The rich, full, restful beauty of deep shadowed chambers seen through arches whose pearly delicacies glistened in strongest sunlight at noonday was altogether different from that life which seemed to come to them in early morning, when the newly-risen sun penetrated nearly horizontally into the deep recesses; and again, late in the day, it was a new delight to wander over the same spots and see them darken and blot out into mysterious shadows as night fell; and in these reflections I realized how hard it is to analyze the principles of beauty in architectural works. This palace is scarcely a great specimen of architecture in the truest sense of the word. The methods of construction are not so good as in many less impressive styles. Walls are often of enormous thickness, not because massive effects were desired; on the contrary, lightness was always sought in appearance, but poor materials and inferior workmanship in actual wall building evidently compelled these heavy proportions. Then there are no new principles or developments of old ones, as are seen, for example, in Roman and Gothic work; nor were they wanted by the designers any more than they are missed by the beholder. There is more of constructive architecture in the forbidding external fortress than in the luxurious palace. Here the simplest and most primitive structures are overlaid with decoration all-sufficing in its own complete beauty. The style is in fact one of decoration, in which the structural works are only the vehicles of the art applied to, and not in, them. If the Moor could have erected his delicately moulded and carved wall linings of plaster and wood without the walls themselves he would gladly have done it. Indeed, it might almost be said that this was actually done, for in some spandrels, over arches, and in other similar situations we find only a light frame-work supporting the plaster which is pierced on either side, and shows the depth of the hollow within. (The width of space, measuring as we would measure a wall, is about eighteen niches in the instance I have in mind.) Again, the forms of the secondary features of arches, such as foliations of soffits and the treatment of face are not constructional at all, as are the cusping and moulding of the Gothic arch. They are expressive forms it is true, but their expression has regard to the grace of the lines and curves of the arch and opening as a whole. It takes no notice of voussoirs, and often ignores even the radiating principle; yet in many other Moorish buildings there are examples of the quick recognition and emphasis of these characteristics, so that it is rather surprising that here, in carrying the decorative treatment to such greater elaboration (in which there is no sign of decadence) the Moors of Granada avoided them in the palace. The columns with their capitals must be mentioned as an exception, for nothing could better embody the idea of graceful upward strength than these slender marble shafts; and the lines of the lower part of the cap, straight up and down, leading into the leaf-forms above, are equally indicative of the forces they resist. The column and capital are themselves made beautiful by accentuation and not concealment of their office and construction. Now when we consider the importance of the evidence of strength in a column, and the sense of insecurity which is engendered by certain twistings and carvings to which experimentalists in other styles have submitted them, it becomes clear that these artists dealt with them aright, seeking in slender, delicate proportions the desired expression of independence of gravity. The stalactite ceilings again reveal no trace of their means of support. They hang high overhead, beautiful and evidently secure, but the evidence is gracefulness. You cannot even guess what upholds them. How different is all this from the northern ribbed vault, in which one may trace stone by stone, from rib to shaft and down to the ground the disposition of weights and resistances. Even in the wooden Artesonado ceilings of the Moors the beams are generally disposed, not as weight-supporting beams, running from wall to wall, but in radiating and intersecting lines to develop beautiful forms. The whole system of this ornamentation seems to proclaim that the tiresome cares of life are to be put aside and forgotten — they who dwell in these halls shall take no thought of how or why things are—they are, and they are beautiful, and that is enough.

It will be noticed that the construction so ignored is only that which is concealed by the ornament. This in itself obeys the laws necessary for the sense of security, and is disposed in lines and masses, which, although regardless, as I have said, of the actual methods of building of the walls and arches which bear them, yet do satisfy the eye with an expression of their own fitness and lightness, an assurance that they will not fall, because they have no weight and because they belong to the positions they occupy.

Among beauties so numerous and varied, it is difficult to choose one for especial study. Unfortunately it was neither possible nor advisable to sketch the whole, piece by piece, as I would have liked. (What delight a man might have in being the first explorer of remains like these.) At last I got seriously to work in the "Hall of the Two Sisters," so called from the great twin slabs of marble which form the centre of the floor — a prosaic origin for the name of a chamber in the Alhambra, where so often a romance or a tragedy lies hidden in a common name. This hall is very little injured by time, and not at all restored; and although the restorations here are all well considered and ably carried out, there is more interest in a part that is all of undoubted antiquity. The Alhambra was commenced in A. D. 1248, by Ibn-l-ahmar, whose motto, "*Wa la ghalib illa Allah*" — "There is no conqueror but God" — is introduced in countless repetitions in the decorations, and notably in this hall. In the centre of the square marble floor a little fountain sends its bright jet of water to fall musically into the shallow, flat basin, if so it may be called — it is only a few inches deep: thence the water trickles along a channel in the pavement, forming tiny cascades over the steps, out into the Court of the Lions, to join forces with the principal fountain and three other similar channels coming from different halls. The view here given is taken looking toward the arched doorway leading to the court, and through it are seen the colonnades, with their light traceried arches. Opposite this doorway is a similar one, and on the other two sides other arches open into alcoves. All four are most beautiful examples of the rich plaster decoration, cast and carved in low relief, and enhanced with colors and gold, which now is faded and timeworn into neutral browns and grays. A dado of elaborate Azulejo tile-work decorates the lower portion of the walls. Over this are bands of ornament with inscriptions. The second one is entirely made up of the pious motto lately quoted, worked in Arabic characters, and which I have drawn to a larger scale. It is noteworthy how much care was bestowed upon the minutest detail. Not only are the characters most beautifully formed, but the twining ornament which fills the background is a study by itself. The feathery leaves, of studied grace of outline and movement, are made up with a systematically varied branching, which is the essence of natural growth. Over this the wall-space is divided up by bands of ornament, or of the geometrically formed Cufic character in inscriptions of poetic fervor truly Oriental, and the broader portions are filled with diapered patterns, geometrical in primary lines, with leaf forms in star-shaped panels. Over the doorways arched galleries open toward the hall, repeating somewhat the lower and larger features; and then begins the splendid stalactite ceiling. First springing from little columns engaged upon the walls, and breaking into an octagon by pendentives over the four corners, it rises in this form above the surrounding roofs, with windows formerly fitted with interlacing tracery and brilliant stained-glass. Then

The Inscription "Wa la Galib Illa Allah" "There is no Conqueror but God". common in the Decorations of The Alhambra: Portion of Band from the Hall of The Two Sisters



the stalactite dome closes in a complicated and intricate multiplication of tiny cells; yet these show upon a closer inspection a system and method which is surprising in its simplicity. Several of the able artists who have described the Alhambra so well have written extended descriptions of these systems; it is therefore unnecessary here to do more than mention them.

"The Hall of the Two Sisters" [*see Illustrations*] is said to have been one of the chief private apartments, the alcoves being sleeping-rooms, and the galleries devoted to the use of the harem. The arches were fitted with elaborate wood lattice screens. Altogether the Hall is one of the most beautiful apartments in the Alhambra, with its symmetrical disposition and variety of accessory chambers; and its considerable size and good state of preservation add again to its interest.

The drawing of the capital is from the open corridor leading from the "Hall of the Two Sisters" to that of "The Embassadors"; not its original position, evidently; probably it was re-erected there in the alterations made by Charles V. It is very delicately carved in marble; the labor and cost seem not to have been considered in its production. The arabesques upon the lower octagonal part are almost as minute and highly finished as if for jewelry. The upper part is a kind of *résumé* of the method of stalactite decoration, exemplifying both its rules and its freedom. Although so small in carved detail, its elaboration was not sufficient for the Moorish artists who made it; for there are traces of still more minute ornament in color upon the little patches of plain surface which remained, and all the carved part was evidently colored in detail, with care and taste that would be considered enough for a whole building according to modern ideas. There is a chapter of art in this small capital.

LECTURES ON ARCHITECTURE.[1] — VII.


CHATEAU DE FLEURIGNY, FRANCE — GATEKEEPERS LODGE

AMONG the Norman nobility who had followed William into England, the rage for erecting fortified castles was quite as great as that for ecclesiastical buildings among the prelates. The common people of the country and even the burgesses in the larger towns were not better lodged than in the previous age; their condition indeed was not in any way improved. In London, even, towards the end of the twelfth century, the houses were still built of wood, and covered with reeds or straw. But the castle-palaces of the Anglo-Norman kings, nobility and prelates, were of a very superior construction. William of Malmesbury, an ancient chronicler, relates that the Anglo-Saxon nobility squandered their ample means in low and mean dwellings, but that the French and Norman barons lived at less expense, though dwelling in large and magnificent palaces. The system, in fact, had become necessary to them, from the previous habits of the country they had left, as well as from their situation in the island where they had settled. Surrounded by vassals whom they held in subjection by the force of arms, and whom they constantly oppressed and plundered in every way, they were so detested by them that deep fosses and lofty walls were indispensable to their security. The Conqueror himself was well aware that the want of fortified places might accelerate his expulsion from his new possessions, no less than it had aided him in his easy conquest of them, and he resolved to guard against such a contingency by the strong castles which he everywhere placed within the royal domains. So much was the practice a matter of course, that the moment one of the nobility received the grant of an estate from the Crown, a castle was built upon it for his residence and defence. And this feudal spirit was not likely to be diminished by the disputes relative to the succession to the Crown, in the following reigns. William Rufus, the son, was as much addicted to the erection of royal palaces and castles as his father, and the stupendous castles of Dover, Windsor and Norwich sufficiently prove that no monarch exceeded him in the strength of his massive structures. Henry I also followed in his steps; but in the reign of King Stephen, the *Saxon Chronicle* asserts that every one who had the ability built a castle, and the whole kingdom was thus covered with them, no fewer than eleven hundred and fifteen having been raised from their foundations in the short space of nineteen years. The assertion of the *Chronicle* would thus seem to be by no means stronger than is justified by the historical facts.

As the castles of old England are so intimately connected with all our ideas of the ages of feudalism and chivalry, it may be proper to give some concise general description of these curious structures. As it was to serve both for residence and defence, the castle was usually placed on an eminence, near a river, and often on the very banks of the stream. Its figure, on the plan, was in general of great extent, and somewhat irregular in form, varying in almost every case according to the natural disposition of the surface, and it was always surrounded with a deep and broad ditch, called the *fosse*, which could readily be filled with water. It was crossed by means of a drawbridge, which could be raised at a moment's notice, and an outwork, called a barbican, designed for a defence of the great gate and drawbridge was placed before the latter. The walls of the barbican were of solid masonry, eight or ten feet in thickness, and from twenty to thirty feet high, with a parapet and open embrasures called "crenelles" on the top. At proper intervals above the wall, square towers were raised, of two or three stories in height, wherein were lodged some of the principal officers of the castle, with apartments for the common servants or retainers, and rooms for the granaries, storehouses, and other necessary offices. The top of the walls and the roofs of the towers were flat, that the defenders, placed there in the event of a siege, might the more safely discharge arrows, darts, and stones on their assailants. The great gate was placed in some convenient part of the wall, flanked with a tower on each side, and closed with massive oak folding doors, plated with iron. An iron grate or portcullis was also lowered by machinery from above. Within this exterior wall, in the larger castles, was a large open space or court, in which a church or chapel was usually placed. Beyond this court was another ditch, wall, gate and towers, like the first, inclosing the inner court, in which was erected the large tower, the "keep" or stronghold of the castle. It was a large structure, four or five stories high, whose enormously thick walls were pierced with very small apertures, serving barely as windows to the gloomy apartments upon which they opened. This great tower was the dwelling of the lord of the castle, and in it the constable or governor of the fortress was also lodged. It was provided with dismal apartments underground for the confinement of prisoners, and the whole building received the appellation of the *donjon* or dungeon. The great hall was also in the keep, in which the friends and retainers of the owner were entertained. At one end of the great hall a platform was raised a little above the rest of the floor, called the dais, and on it stood the table at which persons of higher rank and distinction were always placed. The varieties which occurred in the arrangement and distribution of castles were of course different as circumstances varied, but the most extensive of them were erected very nearly on the plan which has been described.

The taking of Bedford Castle by Henry III, in the year 1224, is minutely described by the old historian, Matthew Paris. The castle was taken by four separate assaults. In the first was taken the barbican, in the second, the outer court; in the third attack the miners threw down the wall by the old tower, where, through a chink in the wall, and at the utmost risk, they gained possession of the inner court; and on the fourth assault the miners fired the great tower, which became so much injured and split that the defenders thought it best to surrender. . . .

On the permanent establishment of Christianity, in the fourth century, its followers were not driven to the necessity of devising any original and typical arrangement of their churches, or of inventing any architectural symbolism of their own. They did no more, at first, than simply to convert to their own use, nearly as they found them, a class of secular buildings already existing, whose very name, even, they still retained. It is supposed by some writers of high authority that it was their aversion to paganism which led them to prefer adopting the basilicas to the ancient temples, for the uses of their worship; but we may find another obvious reason for their doing so in the fact that the former were, in all their arrangements, infinitely better suited to their new purpose. While the temples of the ancients were for the most part very small and confined within, the Roman basilicas, on the contrary, which served the double purpose of a forum or exchange for merchants in the main body or nave of the edifice, and a court of justice at the upper or chancel end, were expressly adapted to the accommodation of a large concourse of people. Besides their spaciousness, this twofold arrangement pointed them out as particularly suitable for the service of the

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[1] Extracts from a lecture by the late Mr. Arthur Gilman, delivered before the Lowell Institute, Boston, in the winter of 1844-45. Continued from page 236, No. 412.

new religion. The tribune, or spacious semi-circular recess which had been the distinguishing feature of the secular basilicas, became that of the ecclesiastical one, also. This part of the edifice, which had been the seat of the prætor and other magistrates of the civil tribunal, was now appropriated to the bishop and his attending clergy, and in front of this was placed the altar, in the centre of the chancel, which was raised several steps above the pavement of the rest of the building. This division of the plan was further marked, in many instances, by a large arch resting on columns on each side, and corresponding with the width of the tribune, and the idea of this is still clearly retained in the chancel arch of the Gothic churches. The forum or great hall of the building, with its colonnades and ambulatories, was of course assigned to the laity of the congregation; nor could any arrangement have been better devised for imparting a visibly august character to the rites and solemnities of the church than that which was thus directly supplied by the Roman basilicas. To make this arrangement more distinctly understood, I would state that the interior of the old King's Chapel, in Tremont Street, Boston, with its square body divided by rows of columns, and its recessed chancel at the eastern end, is constructed almost precisely upon the plan to which I now refer, though the recessed space is perhaps somewhat smaller than the tribune of the ancient halls of justice. But in the little Episcopal church in Old Cambridge the proportion is better observed, and we notice the closest adherence to precedent in this small, but justly admired masterpiece of the art.

It would certainly appear, from an examination of the Roman basilicas, that what has always been considered one of the most obvious expressions of Christian symbolism in our churches — namely, the triple division of the main body or larger portion of the edifice into the nave and side aisles — was unconsciously borrowed from their heathen prototypes. At any rate, the symbolism must have been, in the first place, purely accidental, it being furnished by the very same disposition in the original structures. It has also been thought that the symbolism of the cruciform plan of the Gothic churches — for all the cathedrals and many of the larger parish churches in this style extend over the ground in the shape of a cross — is also to be discovered in the early Christian basilicas. It is true that this form is rather *hinted at* than fully expressed in them, by the transverse portion at the upper end, since that part did not extend itself *outwards*, nor was the general parallelogram of the plan at all broken, save by the semicircular projection of the *apsis* or tribune at the altar end. It follows that not even any tendency to the shape of the cross was shown externally, except in the *upper* part of the building, owing to the whole of that transverse division being of the same height as the nave or centre, while the side aisles were considerably lower, and were roofed over against the main body of the structure; but it is still easy to see in this the germ of the cruciform plan which was subsequently adopted, and it is highly probable that when the idea of this symbol occurred, it was at once carried out in full. The precise manner of the change cannot now, with any certainty, be determined, but it seems to be a question very similar to the one to which I have before adverted in the case of the Grecian temple, in which, though its origin was clearly a refinement upon rude stone structures, the component parts and members of a wooden hut yet seem to be pointed at and imitated. It is perhaps enough, in either case, to suppose that the resemblance was at first purely accidental, but, being noticed, was afterwards improved upon, and carried out to such an extent as almost to lead to the belief that it always existed in the mind of the builders.

On the exterior of the ancient basilicas there was scarcely any attempt at architectural design. With the exception of a low portico sometimes continued along the front, the exterior was of a very bare and homely appearance; nor did the windows at all conduce to architectural finish and expression, as they do in even the plainest buildings in the Gothic style, they being here no more than naked, arched apertures in the wall. Even within the edifice there was a singular mixture of magnificence and rudeness, of sumptuousness and poverty — numerous columns of the most precious marbles, and sometimes of the most exquisite workmanship, and rich mosaic ornaments, which contrasted strangely with heavy surfaces of bare wall, broken only by mean windows, and covered with open-timber roofs, rudely squared and carelessly put together.

When these new temples of religion were erected, at once, from the ground, and intended to be used as churches from their commencement, they nevertheless borrowed so much in the idea of their *whole*, as well as in their details, from the ancient basilicas that it is not at all surprising that they should still have retained their name. The drawing represents a perspective view of the Church of S. Paolo fuori le Murà, from which the general effect of the interior may be completely understood. It will at once be perceived how admirably it was adapted to the reception of an extremely numerous congregation. The numberless columns which the buildings of ancient Rome supplied were put in requisition for constructing such edifices as these, but instead of always connecting the columns by architraves on their summit, arches were spanned from one to another, on which walls were carried up to bear the roofing. Under these arches we pass into the aisles, which are but little more than half the height of the nave or centre, but, running parallel with its whole length, are roofed over against the wall, above the main arches of the nave. The peculiarity of these arches being placed immediately upon the columns, or made to spring from their capitals, is the leading trait in the character of the dawning Romanesque style.

THE ILLUSTRATIONS.

HOUSES OF CHARLES A. WHITTIER, ESQ., MESSRS. McKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y., AND FRANCIS L. HIGGINSON, ESQ., MR. H. H. RICHARDSON, ARCHITECT, BROOKLINE, MASS.

An unforeseen disarrangement of our plans causes us to publish without any description a view of one of the latest groups of buildings which have been added to the attractive features of Beacon Street, Boston.

CLOISTER OF ST. JEROME, BELEM, PORTUGAL.

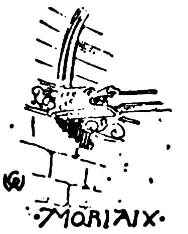
[From a *Photograph.*]

THE "HALL OF THE TWO SISTERS" IN THE ALHAMBRA, GRANADA, SPAIN. DRAWN BY MR. R. W. GIBSON, ARCHITECT.

For description see article on "Spanish Architecture" elsewhere in this issue.

SKETCHES AT PIGEON COVE, CAPE ANN, MASS. BY MR. P. GULBRANSON, BOSTON, MASS.

THE NEW ENGLISH PATENT ACT.



BY an Act of Parliament taking effect January 1, 1884, the laws relating to patents for inventions, registration of designs, and of trade-marks in England have been consolidated and improved so as to, in the main, incline more favorably than heretofore to inventors.

In lieu of patents running in the first instance for three years, as heretofore, they now run for four years, and instead of the stamp duty of £50 heretofore payable before the expiration of the third year from date, such stamp duty and the succeeding one may be paid in annual instalments, by which means the onerousness of the tax is greatly modified. The fees payable in the first instance instead of being £25, as heretofore, are now but £4. The technicalities necessary to be considered and provided against and the acts to be done are greater than heretofore, and the specification, drawings, and other papers must now be prepared with greater care and completeness, and there are several new requirements which render it necessary that skilled and conscientious attorneys be employed. Three or more months' longer time is allowed within which the final papers may be filed than is now the case. If at any time default is made in payment of any of the fees, upon proper reason for delay being shown, an extension of time not exceeding three months will be granted. Amendments to the specification and drawings may be made at any time before the patent is sealed, upon certain proceedings being had and the request advertised. Each application is submitted to an Examiner for the purpose of ascertaining whether the papers are in proper form, if the invention is properly described, if the title properly discloses the invention, etc., but no examination as to the novelty of the invention is provided for in the new law. There is no provision in the new law for the obtainment of patents by parties who simply communicate the invention to others or pretend that it has been communicated to them, a source of great annoyance and persistent injury to inventors in the past. The new law says that each application shall contain a declaration to the effect that the applicants or applicant are or is in possession of the invention, whereof he or they claims or claim to be the true and first inventor or inventors. Appeals from the decisions of the Examiners or the Comptroller General of Patents may be taken to either of the law officers. The provisions regulating the opposing by interested parties of applications for patents are now more definite, and oppositions very similar to the "interference proceedings" in the United States Patent Office are now provided for under the English law. Patents, though granted for fourteen years, are extensible on good grounds therefor being shown, for seven or fourteen years longer respectively. The Patent system is now under the control of the Board of Trade, and the Patent Office is provided with a seal of its own with which all patents will be stamped, instead of being stamped with a fac-simile of the Great Seal of England. Compulsory licenses may be ordered in certain cases, and the amount of compensation fixed, by the Board of Trade.

The Board of Trade has the power to regulate the amount of fees to be levied and paid at the several stages in the prosecution of an application, such as, for instance, where amendments are made, oppositions declared or heard, advertising, appeals, etc., so that it is not absolutely certain at the present time nor can it be until after the system has got into working order what the actual cost of a patent will be, but I think it would be safe to say that a patent on a simple invention could be procured for $75, the usual charge under the present law for a simple case being $250, — a great saving being thus secured to inventors.

It will thus be seen that the new law opens up a vast field for American enterprise and that the cheapness of patents in Great Britain as compared with their cost heretofore, must, necessarily, induce a large number of American manufacturers and inventors to protect their inventions in that country, and thereby bring to

their doors many more customers for their wares than they are privileged to do under the present system. Even under the old system a very meritorious invention when patented in England and properly brought to the notice of the public secured large returns for the outlay, high as it was. Under the present comparatively cheap system I anticipate that a much larger number of patents will be obtained in England by Americans and others, and that, consequently, England will more generally than heretofore be found to be a good market for American goods. **Charles J. Gooch.**

SANITARY PLUMBING.[1]—X.

THE "SELF-SEALING" CLOSET.—DESCRIPTION.

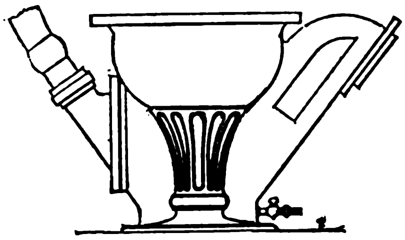


Fig. 20.—Elevation.

To each of the types of water-closets heretofore described, except the "air-vacuum" closet, belong several individual representatives, differing from each other in detail, and though sometimes, for better illustration, a drawing of the particular closet which seemed best fitted to explain the type has been given, the description has in every case been confined, in accordance with our stated intention, to the points which were typical, leaving individual peculiarities unnoticed.

Figures 20, 21, 22 and 23 show a self-sealing closet in elevation, transverse section, plan, and longitudinal section, respectively. It will be seen that the simplest kind of hopper is taken as a general basis of form. A basin and a trap only are used, each forming a part of the other, and these are encased in an iron frame which serves also to conduct and distribute the flushing streams. The iron part may be protected from rust, if desired, by enamel, paint, or any of the new processes invented for the purpose. But it requires no such protection, because the glass of which the bowl and trap are made is not discolored by rust, and the iron frame is made thick enough to withstand its action at least as long as the heavy iron soil-pipes used throughout the house.

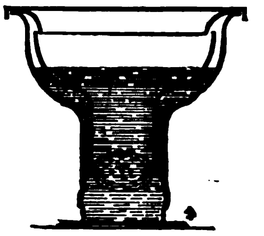


Fig. 21.—Transverse Section of the "Self-sealing" Closet.

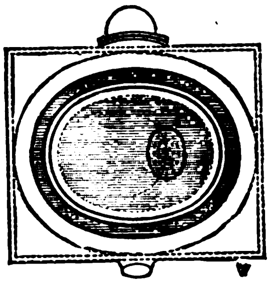


Fig. 22.—Plan.

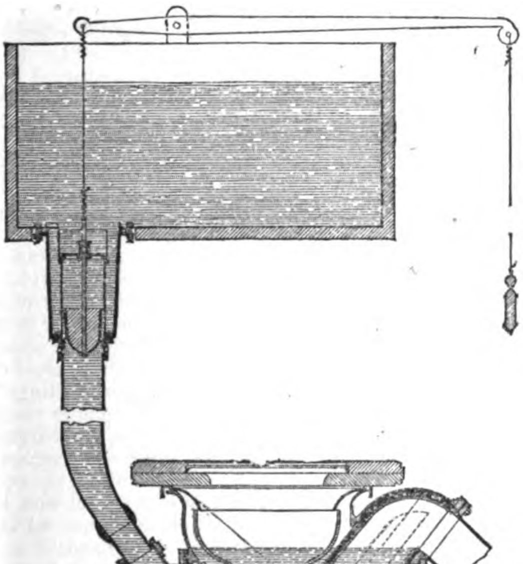


Fig. 23.—Longitudinal Section.

Cast-iron soil-pipes of the proper thickness are found to be so durable that they are now put in, even unpainted, as among the permanent fixtures calculated to last as long as the house itself. Our experience so far has proved that with even and good castings our expectations have been fully realized.

The cast-iron receivers of pan-closets are usually flimsy and uneven in thickness. When, however, the castings are stout and even at the outset, they will last for an almost indefinite length of time. Good pan-closet receivers have been taken out after a use of forty years, and, when broken, found in good condition. The writer has had a number of well-made pan-closet receivers, one-eighth inch thick, which had been in use for ten or fifteen years, broken, and all were found to be in their thinnest part nearly an eighth of an inch thick still. Furnace evaporating-pans made of cast-iron are found to have the same power of resisting corrosion, and great length of life. Probably nine-tenths of all the water-closets sold to-day have their water-passages below the bowl constructed of iron. It is used in nearly all pan, valve and plunger closets for the receiver, often for the trap, and sometimes even for the narrow overflow passage; and many of the best hopper-closets are made either wholly or partly of iron. The iron and glass are so put together that they may be easily taken apart without danger to either, so that, in case of accident, either part may be renewed without loss of the other.

The Flushing

streams (*a*) enter below the level of the standing water in the water-closet, whereby their noise is deadened. Two independent streams are employed, one to eject the wastes and the other to cleanse the sides of the bowl. The entrance of these streams is through two rose nozzles, which break up the water into a large number of small jets. With a given quantity of water, the use of the rose jet furnishes the greatest possible propelling power where the body of water to be removed is larger than the combined sectional area of the jets.

The supply-pipe is made large, so that each individual jet of the rose has the same propelling power that a single jet would have under the same head of water. The jets are made very small, their power being calculated to be just sufficient to lift the small column of water in the trap above it, and between it and its neighboring jet, up to the outflow of the trap and no farther. Thus no power is wasted in driving the water forcibly against the crown of the trap to no advantage, and the full power of each jet is made use of, because the rose nozzle is placed at the bottom of the trap, whence each jet exerts its pressure and friction upon the entire body of water therein. So great is the propelling power of the jets thus used, that, with a tank only four feet above the water-closet, or, in other words, with a water-head of four feet, the wastes are instantly and completely ejected into the drain, when the dip of the trap and size of the jets are regulated accordingly, and if the water above the jets is not simultaneously replenished by an upper flushing sufficient to keep the jets covered and their sound deadened, the roar made by thirty jets of three-sixteenths of an inch in diameter is quite deafening and proclaims their power in no uncertain tones. The upper flushing stream is therefore arranged to always cover the lower jets.

A dip or seal as great as three inches is given to the trap for several reasons; one of which is because it allows of a gradual contraction of the bottom of the bowl below the normal water-level, so that the wastes may be gathered together in the neck of the bowl before the upper flushing water falls upon them. It will then have a tendency to drive the paper and lighter wastes under and out, rather than buoy or float them up, as would be the case were they distributed over a wider area of water.

The lower rose projects its streams in a direction towards the outflow, into the soil-pipe, and parallel with the side of the trap. The nozzle is made of brass and serves at the same time as a coupling to secure the glass bowl firmly to the iron frame. The upper flushing streams enter the space between the bowl and its frame below the level of the standing water, through small holes or slots provided for the purpose in a plate of brass bolted to the side of the supply-passage as shown. This causes the water to rise noiselessly and gradually until it overflows the edge of the glass bowl equally all round, and aids the lower jets in removing the wastes. The time required for the water to rise to the edge of the bowl and overflow is just sufficient to allow the wastes to descend, under the influence of the lower jets, into the neck of the bowl, where they are collected together so that they are most easily acted upon by the water falling from above.

Though the two roses act under the same pressure of water, and are both employed to flush the closet, their functions and principles of action are precisely opposite. The object of the lower rose is to *increase* the propelling force of the water; that of the upper rose, on the contrary, is to *diminish* it. By breaking up the lower stream into a rose-jet, the power is increased, because the friction on the supply-pipe is diminished in amount corresponding to the diminished volume and velocity of the water passing through it, and the wastes are removed by the *momentum* of the water. The jets of the rose have a greater effect in ejecting the wastes from the trap and bowl than would a single column completely filling the pipe, because, while they exert an equal moving force, they do not occupy so great a space in passing, but leave room for the contents of the bowl to be drawn in with them also by suction.

The upper rose, on the other hand, has for its object to break the force of the water and cause it to rise noiselessly and slowly to the rim of the bowl, whence, falling, it drives the wastes by its *weight* alone, and *not* by its momentum. In falling, the upper flushing stream strikes the curved inner sides of the bowl just above the neck.

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[1] Continued from page 235, No. 412.

This destroys whatever momentum the water would acquire in falling from the rim of the bowl, and acts still further as a sound deadener.

(*b*) "The flushing should begin to act *instantaneously* upon operating the pull."

It will be seen from the drawing that the supply-pipe is sealed at the top by the valve, and has no opening except at the bottom beneath the normal level of the water standing in the bowl. For the upper flush the supply does not enter in the usual manner at the top of the bowl, but descends first below it to a point just below the level of the standing water. Hence when the valve is closed the water is held in the pipe by the pressure of the atmosphere acting upon this water-surface. The supply-pipe thus becomes the inverted bottle previously referred to, and would sustain its water-column open-mouthed, provided the length of the supply-pipe did not exceed thirty-three feet, the limit of the abhorrence of Nature for a vacuum. The pipe being full, the flushing begins to act simultaneously with the opening of the valve, and it is not necessary to hold the pull and wait for water to fall from the top to the bottom of and fill a long supply-pipe.

This same principle of the supply-pipe kept full by atmospheric pressure may be adapted to any water-closet in use, though not formed, as is the one we are describing, with special reference to such a form of supply, by constructing and connecting the pipe as shown in Figure 24. The supply-pipe has here an independent branch for the upper flushing. Both the main pipe and its branch descend below the normal level of the water in the trap. The lower pipe enters the trap anywhere best suited to give a proper direction to the jets, while the upper branch has its bend at the point below which it is desired the water shall never be lowered by siphonage, evaporation, momentum, or any other cause. This figure shows the manner in which the "inverted bottle" or "anti-siphon" supply-pipe might be applied to the "wash-out" or any other form of water-closet having the trap entirely below the standing water in the bowl, as in pan, valve, plunger, and most hopper closets. As here arranged, the branch-pipe is shown continuing up beyond the point of its connection with the flushing-rim of the closet, so that it serves to give an after-flush. The extension upwards fills with water during the flushing, and this water falls into the closet after the valve has been closed to restore what water may have been expelled by momentum or by the siphonage caused by the power of the flush. Figure 25 gives in outline a diagram showing another form of the supply-pipe. A double pipe, or rather two pipes, are here used from the valve to the closet. The larger pipe supplies the lower flush, and the smaller the upper. Both are fed by the same valve. Two independent valves, however, might equally well be used. The upper pipe has a sound-deadening chamber at its bottom, which might be constructed quite independent of the closet-bowl.

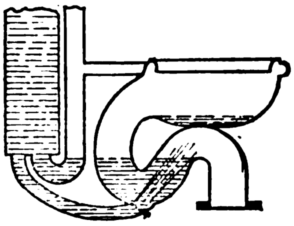

Fig. 24.—Anti-Siphon Supply-Pipe applied to ordinary Closets.

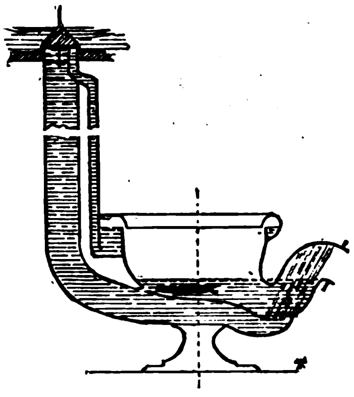

Fig. 25.—Anti-Siphon Supply-Pipe, with two pipes and but one valve.

Figure 26 shows the manner in which the pipe should be constructed when it is desired that it shall hold a very large quantity of water, and have a diameter larger than that of the supply-valve. A special air-pipe is provided in this case; not, however, like the ordinary air-pipe, opening above the tank, but opening below the water in the trap, and directed into it and towards its outflow, so as to aid the water-jets in expelling the wastes. This air-jet serves to allow the air to escape from the top of the supply-pipe as the water enters through the valve. In this manner a supply-pipe of indefinite size may be filled, provided the sectional area of the supply-valve is greater than that of the lower flushing jets.

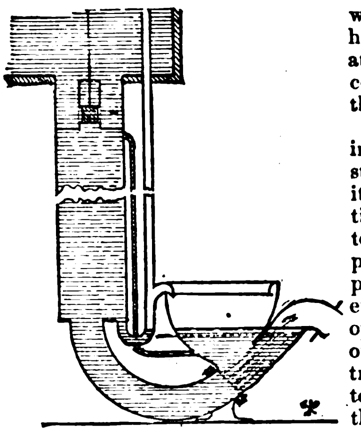

Fig. 26.

The Costly Mormon Temple.—On the ninth of November the main walls of the Mormon Temple were completed. They are ten feet thick, of solid granite, and eighty-five feet high. The foundation was laid twenty-eight years ago. The cost to the present time is $4,500,000. Six years more will be required to complete it.

QUEER CLIENTS.

There are many varieties of the queer client; but the most trying specimen I have met with is the suspicious, inquisitive client, with a turn for sarcasm and an incurable trick of letter-writing. It has been my hap to have some dealings with a pretty fully blown example of this variety,—a coarse old English gentleman with a very fine estate, a house neither new nor old, a pocket full of money, and a taste for building. He was, when in his prime, seldom without some building enterprise on hand, and in a chronic state of excitement and complaint.

It is a good many years since he invited me to run down into Norsex and advise him between the remodelling of his house and building a new one. I discovered afterwards that this was mere playfulness on his part, for he never took any one's advice on any subject. His estate lay in a somewhat low, damp, and malarious part of the country; and he lived all the year round upon his estate like an ideal landlord. Some of his tenants had doubts as to the advantage of this trait, and I have heard them express such with a good deal of point and earnestness. My concern, however, is with the house, which had been built some half-century or more, in a kind of bastard Tudor. The fabric was of brick, and what were supposed then to be Gothic features essential to the style, such as crocketed pinnacles, finials, cusped window-heads, twisted chimney-shafts, four-centred arches with foliated spandrels, and the like, had been distributed with a liberal hand. They were all in compo, after the fashion of the time, and the mouldings had dropped off here and there. The richly-traceried parapets showed their brick core in unsightly scabs and patches; modern cowls, black, varied, and hideous, vulgarized the sky-line, and the dampness of the situation had stained the walls a dirty green, and covered them with an unwholesome parasitic vegetation. The lodges were of the same character, only worse. The drippings of the surrounding trees had rendered them and the almost empty stables forlorn and dispiriting to a degree.

You entered through a sort of groined *porte cochère*, and by way of a vestibule (the windows of which were filled with detestable stained-glass in the vilest taste) into the great hall, dark and gloomy, with sham oak ceilings and fittings. The walls were covered with arms and armor (from Wardour Street) where they did not exhibit tomahawks and the other cheerful implements of savage warfare. Your footfall woke distant and fear-inspiring echoes,—dying away in endless reverberations down long passages all groined in plaster. The principal corridor was decorated in vermilion, green, ultramarine, white and yellow ochre (not gold), in exact imitation, it was said, of the Chapel of St. Francis at Assisi, not very homely in effect,—an altogether uncanny and uncomfortable sort of embellishment for the place. Of the internal joinery, it is impossible to speak with patience. The object of the designer appears to have been to carry the idea of mediæval warfare through all the articles of domestic use; and in some fatal moment a whilom owner had furnished the whole house *en suite* in the Gothic taste, to match the architecture!

Not being at that stage of the proceedings aware of the idiosyncrasy of my client, who had apparently been hitherto infamously treated by every one he had employed, I advised a new house on a more advantageous site, and I was at once directed to prepare plans for adapting the old one. The only pretty, and, indeed, passable portion of the structure was the original cottage, to which the larger house had been added piecemeal. This I wished to preserve. It had no pretensions to architecture; but it had a veranda on two sides of tree branches and trunks, prettily shrouded in climbing roses and creepers, and it had a picturesque thatched roof, with a snug dormer or two peeping out of it. I thought that with some internal alterations it might be made an agreeable change from the solemnities of the sham Gothic of the house, and a pleasant escape from its stately rooms and galleries. It was, of course, ordered to be destroyed.

I prepared two schemes,—one which was a mere extension of the existing house, the new portion to resemble the old, and the old to be renovated; and another scheme, in which the body of the old house was used as a sort of stock whereon to engraft such features of domestic Gothic as were then thought to be "your only wear." The two schemes were submitted to the reversioner, for it was probable that, in the natural course of things, the property must before many years change hands. He decided unhesitatingly for the latter scheme,

and I was accordingly instructed to push on with the *former* without delay.

A poor man cannot afford to pick and choose, and I set to work. 'Twere long to tell of the fights over small things which accompanied the preparation and passing of the plans. When I had thoroughly grasped my friend's character, it was quite easy to obtain black by electing for white. But my complete knowledge of his little ways came too late, — not until I had lost all interest in the matter and desired only to get the affair well out of hand. The contract was signed and the work commenced, and then the real troubles began. It is not difficult for two people to get on together when one of them is deliberately and persistently complaisant. But with the introduction of a third person, — the builder, — the sweet simplicity of this arrangement was upset. Builders are men, and not only men, but generally manly, and they resent any treatment which is based upon the assumption that they are unprincipled sneaks.

My client was excited by a builder as a terrier is by a rat. He never left the spot. Not he! He was on the works the first thing in the morning, — or spying at them through his dressing-room window, — and he smoked his afternoon cigar when the men had gone home, as he perambulated the walls, kicking off a loose brick here, and probing into the work with his walking-stick to test the bond. The workmen swore roundly at these evidences of his interest in their labors. The mortar had no chance of getting mixed in other than the prescribed proportions, — and never was any builder so worried in the matter of the exhibition of vouchers for the integrity of all his materials.

As time wore on every one got sore and everything went wrong. My client conformed to the professional etiquette in so far that he preferred all his complaints against the builder through me. And I am bound to say that he apprised me very frankly of all my own shortcomings.

And now came out a curious part of his character.

He had a knack of writing short sarcastic notes ascribing every commercial vice to the builder and his myrmidons, and by implication, — and even sometimes directly, — the grossest carelessness or incompetence, or both, to myself. At first I was, in my innocence, almost frightened at the gravity and seriousness of his passionate expostulation. But upon running down with all speed to explain or correct what was wrong I was, to my amazement, received with open arms. The causes of complaint were avoided or evaded or made light of. I was "put up" with ceremonious politeness, — marked attentions were showered upon me. Port of special quality, with a recondite history, was produced for my gratification, though I am far from curious in such things. And I was dismissed with presents of rare fruit or what not, and sent on my way in a carriage and pair rejoicing to find on my return, or soon after, another letter full of bitter complainings and taunts.

It was of no use to reply by letters, they were left unnoticed, and every post brought only new grievances. The builder also made me the medium of copious and not ill-founded charges against his employer, — long stories of unwarranted suspicions, and all manner of meanness and injustice.

Driven to desperation, I sent in a request to be relieved from a position which had become intolerable, and I was besought to reconsider my resolution; and so matters dragged on. I was not reconciled to the eccentricities of my client, but I grew callous, and my only hope was a speedy and decent termination to my miseries.

The "extras" which rose under a system of constant interference were, as may be supposed, considerable. This afforded my client a fine opportunity for the exercise of his peculiar talent. Letters of unusual length and concentrated bitterness traversed every item in the bill, and brought counter-charges of all kinds. The builder's courage gave way under the violence of the attack, and he declined to face his employer, except with the support of my presence. A meeting was arranged and we made up our minds for a warm day. We were received at the Hall at lunch time, and found a repast awaiting us fit for a prince. My client put off a discussion of the question which had brought us together. At the end of a pleasant and chatty meal, he placed an envelope in the builder's hand, and bidding him good-day, threaded his arm in mine, and drew me aside into his library. He wished to take my advice about some further work. . . .

Passing through the nearest town on my way to the station, I saw the builder "hanging about" to waylay me *en route*. He looked distraught, and had evidently something of moment to impart. The envelope, it transpired, contained a check for the full amount of his charge, and another £100, "as a consolation for any little extra trouble he had been put to." My own account was paid in due course without cavil, and with a good grace.

But bad times came. The tenants could not pay their rents, farms were vacant on every side, the projected additional work was postponed and finally abandoned, and I was thus relieved from any further concern about the peculiar ways of my very queerest client.

AN URBAN UMBRELLA. — Two German lunatics have sent to the municipality of Buenos Ayres a proposition to cover the city with an umbrella: the base to be 670 feet in diameter, and the height 1520 feet; the ribs to be of cast-iron, and the lining of wrought-iron, and, when hoisted, the umbrella will be over a mile and a half wide; and around it to be a canal to convey the water into the river Plate. They ask $5,750,000 for the little job, and propose to complete it within thirty months.

INCOMBUSTIBLE HOUSES.

THE architect to the municipality of Verdun, M. P. Chevenier, has contributed to the *Génie Civil* a paper on the incombustibility of buildings, which, although more particularly relating to the large Continental house, containing *appartements* on the several floors, nevertheless gives some general advice for the arrangement of buildings so as to prevent fires from attaining unmanageable proportions. He is of opinion that, until preparations for rendering materials incombustible have stood the test of time, their use should only be resorted to by way of additional precaution, while the buildings themselves should be sc constructed that any fire which may happen to break out would be confined within very narrow limits.

The piers that support the principal parts of the structure should be built of such materials as stand heat well without appreciable alteration of form; and preference is given to sandstone, millstone, grit, flint and granite, the joints being made with argillaceous cements like those of Portland. The main portions of the internal walls should be built of similar materials, or, at any rate, faced with them. As regards the exterior, it will be sufficient to face the lintels and jambs of the windows, which are specially liable to be licked by flames.

Indeed, as a rule, the framework of all openings, both in the interior and exterior, is more exposed than the intermediate portions, and should therefore be better protected. When, on account of the design, the walls of the façades cannot be well stayed with masonry, they should be tied by iron rods let into the floors, or by anchors attached to the ends of the main girders. In this manner, walls standing alone for a great height are prevented from twisting, and are exposed to the action of the heat on one of their faces only.

The best way to insure the stability of a building under the influence of fire is to keep the floors from giving way. This is easy enough when they are of iron and pugging, but requires special precautions when they are made of combustible materials. MM. Flachat and Noisette have come to the conclusion that a half-inch layer of asphalt over an inch of argillaceous earth is sufficient to protect a floor, both at top and bottom, in the event of a fire occurring, and this system is carried out at the fodder-lofts of the Paris General Omnibus Company. A layer of plaster-of-Paris, fine concrete, cement, or clay, 3 or 4 millimetres (0.11 to 0.15 inch) thick, or a paving of tiles, permits of waiting for assistance, by preventing the air from coming in contact with the wood, and thus maintaining combustion.

The ceilings should be thick and laid on wire gauze, to the exclusion of laths; and channels in them should be botched with clay, small twigs, and chopped hay. Similar precautions should be taken with the roofs between the rafters, thus insuring tightness, a conservation of heat, and a diminution of danger from fire. The simplest arrangement consists of a rough ceiling of plaster and argillaceous sand on wire-gauze nailed under the rafters, and a planking with closed joints under the roofing proper, which should be incombustible, and consist of slates, tiles, or sheet metal.

In the case of iron floors being adopted, the parquetry should be laid on pitch or cement, and special precautions should naturally be taken with the grates and chimneys.

As the floors are supposed to be incombustible, the fire can only extend from story to story by the staircase, which must, therefore, be isolated from the rest of the building. The well should be surrounded by thick walls capable of arresting the flames, and the landings should be flagged and arched or constructed of iron and concrete. The notch-board may be of iron or stone, and the steps of cast-iron and tiles, or even of wood set in cement. In this latter case the wood does not easily catch fire, as the air can only get to the upper surface. There should be incombustible and almost hermetically tight appliances for closing all openings from the several landings. Thus doors of thin sheet-iron with wrought-iron frames may be employed, or the doors may consist of two faces of wood-work with a sheet of iron between. The top of the well should be closed in by wrought-iron and bricks that stand the fire well, and the staircase windows should be made incombustible by means of metal frames and mica panes.

The outside windows of the edifice may be provided with Venetian blinds of iron, rolling-blinds of wire-gauze, or iron shutters, to be closed in the event of danger threatening. To prevent the fire from spreading by the roof, it may be broken by transverse gables at intervals; and the use of combustible materials in all projecting ornamentation is to be avoided.

In conclusion, M. Chevenier does not consider it indispensable that all the materials of a house should be incombustible or non-inflammable, but he contends that the carcass of the house should be built in such a manner as to localize the fire, and, to insure this, it will be sufficient to adopt the measures named above. This does not prevent the use of materials, such as the roofing-timber, for instance, from being rendered incombustible by any of the various processes for this purpose.

WROUGHT-IRON CHIMNEYS.

Steelton, Pa., November 16, 1883.

To the Editors of the American Architect:—

Dear Sirs,— Replying to your favor of 3d inst. beg to say that we have several wrought-iron chimney-stacks, and find them durable and economical. We have them in use as follows:—

Blast-Furnace No. 2, Whitwell Stove stack, 6′ 6″ diameter, 165′ high, lined with 9″ fire-brick for thirty feet, 4″ red brick for 135 feet. Erected 1877.

O. H. Furnace stack, diameter, 7′; height, 135′; lined same as above. Erected 1880.

Rail Mill boiler-stack, No. 2, 6′ diameter, 112′ high. Erected 1881.

Whitwell Stove stack, 6′ 6″ diameter; height, 170′; lined same as above. Erected 1881.

Forge boiler-stack, 7′ diameter, inside shell lined with 9″ fire-brick for 30 feet, then 4″ red brick to top, 110′ high from base plate. Erected 1869.

Rail Mill boiler-stack, 7′ diameter, 110′ high, lined as above. Erected 1874.

Rail Mill gas-furnace stack, same as Rail Mill boiler-stack. Erected 1875.

Rail Mill gas-furnace stack, same as Rail Mill. Erected 1876.

Hoping the enclosed descriptions will prove satisfactory, I remain,

Yours truly, L. S. Bent, Supt.

[As no one seemed to be in possession of the information asked for by Mr. Bancroft in our issue for September 22, we have obtained the foregoing data from the Pennsylvania Steel Co.— Eds. American Architect.]

A PROFESSIONAL VIEW OF THE EXPLORATIONS AT ASSOS.

To the Editors of the American Architect:—

Dear Sirs,— The conference of the Archæological Institute, on October 31st, first drew public attention to the important work accomplished by Messrs. Clarke and Bacon in the last year of their exploration at Assos. Indeed, the uncovering and complete technical restoration of this Greek provincial city, which maintained a consistent architectural character from archaic times down to the Byzantine era, is an event of first-rate importance, not only to archæology, but to the practice of architecture. It is not denied by any school of architecture that a knowledge of the fundamental principles of Greek art is the proper basis of professional training. Greek forms and Greek principles are therefore instilled into the mind of the student with the object of purifying the sources of expression by a familiarity with the highest type of architectural form yet exhibited in the history of art. This instruction is conveyed by text-books setting forth the details of the greatest monuments of the style,— the temples and other solemn and ceremonious hieratic forms, in which the spirit of this fortunate people is shown at its most exalted point of expression. Comparatively few, if any, intimations of their style of work in structures of minor importance, in domestic buildings, for example, in baths, stoas, market-places, tombs, theatres, fortified walls and bridges, have been accessible; for the Greek element at Pompeii was a sophisticated exotic in a strange land, and carried with it too many reminiscences of Roman influence to fairly express the forms which pure Greek art would assume in its unguarded and more playful moments. For the want of such accessible illustrations of its copiousness and elasticity, the Greek spirit has been apt to assume in the minds of students an aspect of remoteness from common sympathy and use; and thus its true function in purifying and refining the practical work of design has fallen short of fulfilment. The publication of Stuart and Revett's "*Antiquities of Athens*" tended in the early part of the century to stiffen and freeze the sources of design and to encourage base imitation. The Greek idea was formulated and made to do cold service in the hands of ignorant builders. The influence of Pompeii in a later day was in the direction of license; but now, when architecture seems to have degenerated — at least in the hands of English-speaking people — into a series of archæological revivals, and the modern spirit, embarrassed by its huge inheritance of precedent, seems especially to need the chastisement and correction of high artistic principles of design, I am persuaded that a fuller illustration of the capacity of Greek art will go farther to accomplish this result than any other influence which can be brought to bear upon the profession.

Assos, revived, as it were, by the indomitable diligence and honest scientific methods of these young Americans, by Clarke's archæological learning, and by Bacon's elegant and conscientious draughtsmanship, will, we are told, present to us a picture of Greek life at least as complete as that of Roman life in the remains of Pompeii and Herculaneum. It will exhibit the true Greek spirit, not in its sublime or heroic mood, but still Greek, even in the homely life of a little provincial seaport,— pure Greek, even after the dominant Roman had invaded it with his conquering arch. The early builders of Assos were among those who first gave distinctive Greek form to the archaic traditions of Mesopotamia, and their descendants kept the advancing type pure from all Western alloys at least down to the third century of the Christian era. This little town was thus apparently virgin Greek for eight or nine centuries, and, in its monuments, presents the history of a consistent growth towards the civilization which was consummated in Attica. We shall here see the whole process of the development of Greek ideas; we shall see the architects experimenting with forms, inventing freely, playing with *motifs*, all in a very modern fashion, but never ceasing to be Greek. Thus, as it seems to me, this artistic and fructifying spirit is to receive a largeness of illustration which was not anticipated by those who forwarded, conceived and carried on these curious investigations, and which cannot fail to interest the architect, and to awaken his artistic sense. The fecundity of design, especially as exhibited in the streets of tombs, is an unexpected quality in Greek art and one which cannot fail to commend it anew to the student and bring it nearer to his sympathies. By the accident of fashion or by some unexplained process of evolution, modern practice seems to me rapidly approaching the moment when such a new dispensation of forms will be apt to exercise upon it a marked and wholesome influence, and perhaps to turn it towards the formation of a new school, a reformation, indeed, far better suited to our civilization than any mere revivals, however romantic or picturesque.

For these reasons it is especially incumbent upon the profession to do all in its power to forward the speedy and fitting publication of the results of these interesting researches. It is no mere archæological or antiquarian interest which concerns us, but the propagation of a purer and more prolific principle of design. Funds are urgently needed to procure the fulfilment of this promise and to make available to all the studies of Assos. There is every reason why American architects should not hold aloof from such a cause.

Henry Van Brunt.

PARGETING.

November 12, 1883.

To the Editors of the American Architect:—

Dear Sirs,— Please inform me through your journal, of the composition of the plaster for pargeting, and its merits as compared with ordinary mortar? Very truly yours, T.

[Pargeting usually means the lining of chimney-flues with a coat of mortar, and the mortar used is simply that with which the chimney is built. — Eds. American Architect.]

MACHINE SHOPS AND FOUNDRIES.

Chicago, November 9, 1883.

To the Editors of the American Architect:—

Gentlemen,— Oblige me with the information of whom illustrations, plans, etc., can be obtained for the most recently constructed machine-shops, foundries, and forge establishments. Is there any publication devoted to this branch of building or any making a special department of such?

I am a subscriber to your journal but do not find any articles on this subject. Very truly, W. H. Banks.

[We know of no publication of the kind referred to, but perhaps some suggestions could be obtained from the "*Journal of the Iron and Steel Institute*, published by E. & F. N. Spon, New York. The proprietors of the best foundries and machine-shops are not generally disposed to have their arrangements made known. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Bridge Travel in London.— Proposals having been made for building a new bridge over the Thames, statistics have been collected to show the amount of travel over the present bridges. The following table shows the average daily travel over a few of the principal bridges:

London	110,525	pedestrians,	22,242	vehicles.
Black Friar's	79,198	"	13,875	"
Westminster	44,460	"	11,750	"
Waterloo	32,815	"	10,370	"
Southwark	25,507	"	3,340	"
Vauxhall	17,828	"	5,453	"
Charing Cross	16,130	"		
Chelsea	14,500	"	2,338	"
Battersea	10,260	"	1,342	"

The addition of the other bridges gives a total of 384,042 pedestrians, and 75,325 vehicles. — *Dingler's Journal.*

The Yellowstone Paint Pots.— Leaving the Minute Man and pushing on a a few miles we were induced, in obedience to a finger-post, to make a détour to the left of about half a mile and visit the "Paint Pots." These are situated in a pretty piece of fir timber, the approach of the pedestrian being over a sward of soft green moss and ferns, as picturesque as any spot upon the Wissahickon. The guide-book (evidently written by a tourist in a hurry) slights this exquisite bit of nature with the paragraph: "The Paint Pots are very fine and of different colors." I should think they were very fine! Let me try to describe them. From the base of a little hill spout three or four tiny fountains of hot water, and this water brings with it a variety of minerals in solution, which it deposits upon the half-acre upon which it thinly and slowly distributes itself. With a piece of stick I transferred from these little streams to a visiting card fifteen distinct and separate colors of brilliant hue, intending to carry them home with me, but, unfortunately, exposure to the air converted them to powder and they have disappeared, leaving nothing but a few stains upon the pasteboard. They consisted of vermilion, lake, pomegranate, brick-red, crushed-cherry, pink, white, madder-brown, purple, *cafe au lait*, green, orange, yellow, straw and mauve. Of blue I could not find a trace, and yet nature, apparently aware of this omission, had filled the basins of these miniature geysers with water so clear that the reflection of the heavens gave them a beautiful azure tint. To me this was one of the choicest treats of my visit, but, as I said before, I had no notion of the effects which could be produced by coloring until then.— *Cor. Philadelphia Press.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

288,200. **Plastering.** — Hiram Bissell, Hartford, Conn.

288,207. **Awning.** — Adoniram J. Chandler, Fern Bank, O.

288,212. **Fire-proof Shutter.** — John T. Cowles, Chicago, Ill.

288,226. **One-hand Plane.** — Lorenzo G. Gilson, Fort Scott, Kans.

288,235. **Attachment to Dividers.** — Hermann Hanstein, Chicago, Ill.

288,262. **Composition to be used in the Manufacture of Artificial Stone.** — James L. Rowland, New York, N. Y.

288,269. **Fire and Water Proof Paint.** — David H. Smith, Mishawaka, Ind.

288,273. **Sash-holder.** — Charles E. Steller, Milwaukee, Wis.

288,282. **Window-Screen.** — Jas. Watson, Marinette, Wis.

288,304. **Fire-Escape.** — Jesse H. Burks, Los Angeles, Cal.

288,307. **Adjustable Eaves-Trough Bracket.** Franklin P. Campbell, Bloomfield, N. J.

288,325. **Safety Device for Elevators.** — Oliver B. Gaston, Elizabeth, N. J.

288,332. **Apartment-House.** — Elias T. Hatch, New York, N. Y.

288,334. **Faucet.** — William H. Hedges, Newark, N. J.

288,338. **Sheave for Sliding-Doors.** — Samuel Herbert Houghton, Harvard, Mass.

288,345. **Lock-Hinge.** — John A. Kline, Royer's Ford, Pa.

288,347. **Brick-Kiln.** — Henry Konhorst, Henderson, Ky.

288,352. **Follower for Ram-Elevators.** — William R. Low, San Francisco, Cal.

288,354. **Cyclone-Refuge.** — John N. Mileham, Jersey City, N. J.

288,376. **Saw-Clamp.** — Geo. N. Stearns, Syracuse, N. Y.

288,383. **Elevator-Gate.** — Benjamin C. Van Duzen, Cincinnati, O.

288,394. **Incline-Plane Fire-Escape.** — Ezra H. Bailey, Washington, D. C.

288,403. **Boring-Machine.** — Hibbard T. Bowen, Philadelphia, Pa.

288,411. **Fire-Escape.** — Chas. Connolly, Turners Falls, Mass.

288,432. **Wrench.** — James M. Harland, Dayton, O.

288,438. **Vise.** — John W. Hudson, Wellington, Ill.

288,447. **Fire-Escape.** — Thomas K. Keith and Roswell Carleton, Haverhill, Mass.

288,448. **Fire-Escape.** — James Kennedy, Strabane, County of Tyrone, Ireland.

288,453. **Fabric for Veneers.** — Frederick Koskul, St. Louis, Mo.

288,455. **Folding-Ladder.** — John K. Landes, Caledonia, O.

288,466. **Kiln for burning Brick, Tiles, etc.** — Henry McCue, St. Louis, Mo.

288,498. **Roofing-Tongs.** — Theodore Schwarz, Sedalia, Mo.

288,512. **Knob-Lock.** — Le Grand Terry, Horseheads, N. Y.

288,535. **Ventilating-Skylight.** — Chester L. Williams, New York, N. Y.

288,549. **Bench-Vise.** — William H. Cloud, Detroit, Mich.

288,564. **Ventilator.** — Robert Foulsham, Boston, Mass.

288,570. **Electric Hotel-Annunciator and Fire-Alarm.** — Albert T. Hess, Des Moines, Iowa.

288,571-572. — **Vault-Cover or Illuminating Grating-Tile and Surface made thereof.** — Thaddeus Hyatt, New York, N. Y.

288,573. **Means for Preserving the Seal in Traps of Water-Closets, Urinals, Wash-Basins, Sinks, etc.** — James P. Hyde, New York, N. Y.

SUMMARY OF THE WEEK.

Atlanta, Ga.

Chamber of Commerce. — Five-st'y brick and granite building, 52′ x 120′, cor. Pryor and Hunter Sts.; cost, $50,000; Fay & Eichberg, architects.

Office-Building. — The "Constitution" Publishing Company, office-building, 58′ x 100′, cor. Alabama and Forsyth Sts.; day labor; Kimball, Wheeler & Co., architects.

Club-House. — Lee Smith, three-st'y brick and stone club-house, 25′ x 50′, Wall St.; cost, $15,000; Fay & Eichberg, architects.

Store. — Williams Estate, three-st'y iron, brick and stone store, 30′ x 110′, Peachtree St.; cost, $8,000; Fay & Eichberg, architects.

Dwellings. — R. H. Richards, three-st'y brick dwell., terra-cotta finish, Peachtree St.; cost, $20,000; Humphries & Norman, architects.

Isaac May, three-st'y brick and stone dwell., cor. Washington and Crumley Sts.; cost, $18,000; Fay & Eichberg, architects.

C. W. Hunnicutt, two-st'y frame dwell., West Peachtree St.; cost, $20,000; Fay & Eichberg, architects.

W. B. Lowe, frame dwell.; cost, $10,000; Bruce & Morgan, architects.

A. B. Steele, two-st'y frame dwell., Peachtree St.; cost, $5,000; Fay & Eichberg, architects.

Mrs. Walter Gordon, 2 frame cottages, Peachtree St.; cost, $3,000; E. G. Lind, architect.

Rectory. — Rectory for Church of the Immaculate Conception, two st'y, brick and stone, cor. Pryor and Hunter Sts.; cost, $8,000; Fay & Eichberg, architects.

Baltimore.

Building Permits. — Since our last report twenty permits have been granted, the more important of which are the following: —

Michael Wright & Co., two-st'y brick building, in rear of n w cor. Druid Hill Ave. and Wilson St.

Hanline Bros., two-st'y brick building, e s Dallas St., between Eastern and Canton Aves.

G. & W. Klein, 2 two-st'y brick buildings, s s Randall St., w of Patapsco St.

L. C. Smith, 3 two-st'y brick buildings, s s Randall St., w of Patapsco St.

August Hannemann, 4 two-st'y brick buildings, n e cor. Jefferson St. and Madeira Alley.

W. L. Elliott, 3 three-st'y brick buildings, w s Mount St., n of Lexington St., and 3 two-st'y brick buildings in rear, e s Bruce Alley.

Henry Bushman, three-st'y brick building, n s Lexington St., between Howard and Park Sts.

Alex. M. Briscoe, two-st'y brick building, w s Gilmor St., n of McHenry St.

John Stack, 2 three-st'y brick buildings, s e cor. Harlem Ave. and Schroeder St.

John Kern, Jr. & Co., one-st'y brick building, 33′ x 90′, s w cor. Cross and Wicomico Sts.

Boston.

Building Permits. — *Brick.* — *Appleton St.*, near Berkeley St., Ward 16, for Albion Knowlton, tenement, 24′ 6″ x 56′, four-st'y flat; M. McLaughlin, builder.

Wood. — *Charles St.*, rear, near Dorchester Ave., Ward 24, for B. D. McDonald, stable, 18′ x 20′, one-st'y pitch.

Cheney St., near Blue Hill Ave., Ward 21, for Edward Reynolds, stable and carriage-house, 25′ x 50′, two-st'y flat; Joseph A. Hayford, builder.

Moreland St., cor. Blue Hill Ave., Ward 21, for Samuel Weld, 2 dwells., 23′ 6″ x 56′, two-st'y hip; J. H. Burt & Co., builders.

Clifton Ave., cor. Clifton St., Ward 20, for Joseph Breckenbridge, 4 dwells., 30′ x 36′, two-st'y pitch; Hamilton & Parks, builders.

Wheatland Ave., rear, near Washington St., Ward 24, for John Galvin, greenhouse, 15′ x 98′, one-st'y pitch; Joseph P. Shaw, builder.

Vaughan Ave., near Geneva Ave., Ward 24, for Charles Chambers, dwell., 22′ x 31′, two-st'y pitch.

Warren St., cor. Holborn St., Ward 21, for S. F. Rowe, dwell., 17′ x 24′ and 32′ x 41′, two-st'y pitch; E. F. Brown, builder.

Boylston St., rear, Ward 23, for Abraham Bell, stable, 18′ x 24′, one-st'y pitch.

Mulvey Ave., rear 106 Heath St., Ward 22, for John B. Mulvey, 2 dwells., 20′ x 32′, three-st'y flat; Geo. Giggie, builder.

Ruggles St., *Nos.* 24 *and* 26, Ward 19, for Simon Goldsmith, 2 dwells., 20′ x 45′, three-st'y flat.

Heath St., near Walden St., Ward 22, for Abraham F. Rogers, dwell., 22′ x 37′, three-st'y hip.

Meridian St., cor. Falcon St., Ward 1, Timothy McCarty, 2 dwells., 20′ x 38′ 6″, three-st'y flat; Herman Drake, builder.

H St., *Nos.* 157 *and* 159, Ward 14, for Mrs. Julia W. Howe, 2 dwells., 20′ x 34′, two-st'y flat; Holbrook & Harlow, builders.

Brooklyn.

Building Permits. — *Seventh Ave.*, e s, 50′ s Thirty-ninth St., two-st'y frame tenement, tin roof; cost, $600; owner and builder, William Cullen, Seventh Ave., cor. Thirty-ninth St.; architect, S. B. Bogert.

Broadway, w s, 126′ n Stockton St., three-st'y brick store and tenement, tin roof; cost, $8,000; owner, architect and builder, Jno. G. Porter, 405 Pearl St., New York City.

Palmetto St., *No.* 76, n e s, 300′ from Bushwick Ave., two-st'y frame dwell., tin roof; cost, $2,400; owner and builder, Andrew Walker, 106 Palmetto St.

Carroll St., s s, 126′ w Seventh Ave., 8 three-st'y brownstone front dwells., tin roofs; iron cornices; cost, each, $7,000; owner, Thos. Reid, 20 Nassau St., New York City; architect, H. J. Farquhar; builder, E. T. Rutan.

Carroll St., s s, 240′ w Fifth Ave., three-st'y brick tenement, tin roof; cost, $3,000; owner, M. E. Lynch, 365 Bedford Ave.; architect, I. D. Reynolds.

Withers St., s s, 147′ w Graham Ave., three-st'y frame double tenement, tin roof; cost, $4,000; owner and builder, M. Kronheim, on premises.

Suydam St., *Nos.* 23 *and* 25, n s, 225′ e Broadway, 2 two-st'y frame tenements, tin roofs; cost, each, $3,000; owner and builder, Geo. Doering, 27 McKiben St.; architect, T. Engelhardt.

Park Ave., n s, 100′ w Marcy Ave., 2 three-st'y frame tenements, one to have store, tin roofs; cost, each, $4,000; owner, Caspar Brecht, 222 Ellery St.; architect, T. Engelhardt; builders, J. Rueger and H. Bruchhaeuser.

Eighteenth St., *No.* 359, n s, 75′ from Seventh Ave., three-st'y frame tenement, tin roof; cost, $3,000; owner and architect, J. H. or I. H. Herbert, 116 Gates Ave.; builders, P. McCoppen and P. Hughes.

Prospect St., n s, 83′ w Bremen St., 2 one-st'y buildings, gravel roofs; cost, $8,000; owners, Obermeier & Liebmann, Bremen St.; architect, Th. Engelhardt.

State St., n s, 20′ e Nevins St., three-st'y brick dwell., gravel roof; cost, $5,000; owner and builder, John Demott; architect, Joseph Platt.

Clifton Pl., s w cor. Nostrand Ave., 10 two-st'y and three st'y brown stone front dwells., tin roofs; cost, each, $7,000; owner, Jas. R. Robbins, 363 Nostrand Ave.; architect and builder, Geo. Burton.

Lafayette Pl., s s 210′ e Broadway, two-st'y frame dwell., tin roof; cost, $3,000; owner, Anna A. Fardon, 119 Carlton Ave.; architect and builder, A. A. Fardon.

Prospect Ave., s s, 60′ e Eleventh Ave., one-st'y frame enclosed shed, gravel roof; cost, $4,000; owner, Thos. McCann, 853 Douglass St.; architect, Peter Graham.

Prospect Ave., n s, 120′ e Eleventh Ave., one-st'y frame enclosed shed, gravel roof; cost, $4,000; owner, etc., same as last.

Union Ave., w s, 100′ n Withers St., 2 two-st'y frame dwells., tar and gravel roofs; cost, each, $1,000; owner, Wm. Coit, 77 First Pl.; builder, E. A. Willoughby.

Alteration. — *Union St.*, s s, 125′ e Nevins St., brick factory raised one-st'y, gravel roof; cost, $2,500; owners, Kenyon & Newton, 528 Union St.

Chicago.

Bank-and-Office-Building. — G. H. Edbrooke is architect of the bank-and-office-building for Cooper & Carson, on Dearborn St., near Monroe St., 100′ x 131′, eight-st'y and basement, first-st'y brownstone, upper stories Anderson pressed-brick; cost, $200,000.

Flats. — G. H. Edbrooke, architect, planned the flats for J. D. Fanning, on Indiana St., 30′ x 75′, four-st'y, Anderson pressed-brick; cost, $14,000.

Warehouse. — G. H. Edbrooke, architect, planned the warehouse for Hiram Sibley, Clark St., cor. North Water St. and the River, 200′ x 240′, nine-st'y high, one of the heaviest buildings in the West; each floor will be capable of holding a weight of 500 pounds to the square foot; cost, $500,000.

Building Permits. — E. Ambronstes, two-st'y flats, 591 West Harrison St.; cost, $5,000; architect, F. Kettenich; builder, J. W. C. Neff.

H. F. Waite, three-st'y flats, 2130 Butterfield St.; cost, $3,000: architect, W. H. Drake; builder, A. J. Halberg.

H. F. Waite, three-st'y flats, 2131 South Clark St.; cost, $3,000; architect, W. H. Drake; builder, A. J. Halberg.

B. Lewis, two-st'y store and dwell., 235 Thirteenth Place St.; cost, $3,500; architect, F. Kettenich; builders, Edward & Holman.

J. Woodward, three-st'y flats, Thirty-third St.; cost, $9,000; architects, Dixon & Townsend; builder, Wm. Freund.

Frank Novatny, three-st'y store and flats, 585 and 587 Centre Ave.; cost, $21,000; architect, J. Whitner.

Frank Ammonn, three-st'y flats, 1045 North Clark St.: cost, $8,000; architect, J. Karls; builders, Hansen & Anderson.

E. F. Dunn, 4 two-st'y stores and dwells., 705 to 709 Madison St.; cost, $9,000; architect, J. J. Egan; builder, T. C. Nagle.

C. F. Gray, two-st'y store and dwell., 392 Wells St.; cost, $6,000; architect, H. Surks.

C. H. Slack, two-st'y barn, 395 West Adams St.; cost, $3,000.

A. J. Cooper & J. D. Carson, eight-st'y office and bank-building, Dearborn St., near Monroe St.; cost, $200,000; architect, G. H. Edbrooke.

John Smith, 20 two-st'y and cellar dwells., 196 to 224½ Warren Ave.; cost, $90,000; architect, W. A. Furber; builder, W. J. Waddell.

O. M. Sheldon, three-st'y and cellar dwell., 42 Douglas Ave.; cost, $6,000; architect, W. A. Furber; builder, J. Griffiths.

Mrs. S. Glade, 2 two-st'y flats, 659 and 661 Robey St.; cost, $7,000; architects, Frohmann & Gibsen; builder, F. Gottschalk.

John Johnson, two-st'y flats, 541 Leavitt St.; cost, $3,500.

H. M. Hosick, two-st'y and attic dwell., 850 and 852 Park Ave.; cost, $12,000; architect, E. Bauman; builder, C. G. Maller.

L. H. Thairn, three-st'y store and dwell., 218 and 220 West Division St.; cost, $7,500; architect, H. F. Starbuck; builder, Geo. Peterson.

C. D. Mayer, three-st'y dwell., 73 Delaware St.; cost, $6,000; architect, H. M. Hawley.

D. D. Healy, two-st'y dwell., 553 Leavitt St.; cost, $3,200.

O. M. Wells & Co., 6 cottages, 69 to 79 Kendall St.; cost, $7,500.

E. L. Smith, 5 three st'y dwells., Indiana St., cor. Rush St.; cost, $20,000; architects, Cudell & Blumenthal; builders, Willis & Schell.

Streeter & Tucker, 3 three-st'y stores and dwells., 971 to 975 Van Buren St.; cost, $20,000; architects, Wheelock & Clay; builders, W. M. Crilly & Co.

Dr. E. W. Lee, 2 three-st'y flats, 438 and 440 Harrison St.; cost, $12,000; architect, J. R. Willet; builder, W. M. Crilly.

Mrs. L. Johnson, two-st'y store and flats, 484 and 486 Milwaukee Ave.; cost, $15,000; architect, C. Hansen; builders, Vagerlund & Nelson.

H. Goldsmith, four-st'y flats, 240 Indiana St.; cost, $7,000; architect, C. Cobb; builder, J. Blatteau.

J. Manakan, two-st'y flats, 25 and 37 West Division St.; cost, $6,000; builder, F. Hanson.

B. Stein, three st'y store and dwell., 1029 West Madison St.; cost, $5,600; architect, Wm. Strippleman.

Milwaukee, Wis.

Building Permits. — Chris. Templin, dwell. for C. M. Lantry on Nineteenth St., Fourth Ward; cost, $3,000.

Carl Jeske, store for John Helms on Third St., Sixth Ward; cost, $5,000.

New York.

Club-House. — Messrs. Smith, Prodgers & Co. have been appointed contractors for the erection of the New York Athletic Club-House, on the s w cor. of Sixth Ave. and Fifty-fifth St.

Stable. — For Mr. David B. Fairweather, a three-st'y brick stable, 25′ x 90′, is to be built on the north side of Fifty-seventh St., 150′ e of Lexington Ave.; cost, about $16,000.

Stores. — On the north side of Thirty-fifth St., near Seventh Ave., a six-st'y building, 66′ 8″ x 100′, of stone, brick and terra-cotta, first story to be used for stores, flats above, is to be built for Mrs. Marie L. Olliffe, from designs of Mr. George Edward Harding.

Building Permits. — *One Hundred and Thirty-*

fourth St., s s, 100′ w Seventh Ave., 7 three-st'y brick dwells., tin roofs; cost, each, $6,000; owner and architect, Wm. J. Merritt, 118 West One Hundred and Twenty-ninth St.; builders, John Fullam and R. A. Hollister.

East Twenty-fourth St., No. 12, four-st'y brick dwell., tin roof; cost, $25,000; owner, Janet B. Brown, 39 East Twenty-third St.; architect and builder, M. Magrath.

South Fifth Ave., No. 105, five-st'y brick factory, tin roof; cost, $21,000; owner, Cyprien Gousset, 87 South Fifth Ave.; architect, J. M. DuBois; builder, O. E. Perrine.

One Hundred and Forty-sixth St., s s, 104′ w Seventh Ave., one-st'y frame workshop, tin roof; cost, $4,000; owner, Manhattan Railway Co., 71 Broadway; builders, J. W. Close and Meeker & Hedden.

Seventy-ninth St., s s, 41′ w Fourth Ave., 2 four-st'y brick and stone dwells., tin roof; cost, each, $20,000; owner, James V. S. Woolley, 75 East Seventy-ninth St.; architect, Jas. E. Ware.

Seventy-fifth St., s s, cor. Broadway and Tenth Ave., three-st'y brick stable, tin and slate roofs; cost, $60,000; owner, Edward Clark Estate, 25 West Twenty-third St.; architects, Chas. W. Romeyn & Co.

One Hundred and Forty-fifth St., n s, 100′ w Brook Ave., three-st'y frame tenement, tin roof; cost, $5,500; owner, Mary Haffen, One Hundred and Forty-fifth St., cor. Concord Ave.; architect, A. Pfeiffer; builder, Chas. Haffen.

Eighty-second St., n s, 175′ e Ninth Ave., 2 four-st'y brick dwells., tin roofs; cost, each, $25,000; owner and builder, Richard Deeves, 243 East Thirteenth St.; architects, D. & J. Jardine.

Eighth Ave., e s, 80′ n One Hundred and Twenty-ninth St., four-st'y brick tenement, tin roof; cost, $10,000; owners and builders, White & Anderson, 420 East One Hundred and Twentieth St.; architect, John A. Hamilton.

Morris St., n s, 93′ 3″ e Scammel St., running through to Madison St., 8 five-st'y brick tenements and stores, tin roofs; cost, each, $12,000; owner, John J. Macdonald, 1216 Third Ave.; architect, John Brandt.

One Hundredth St., n w cor. Ninth Ave., 4 five-st'y tenements and stores, tin roofs; cost, each, $9,000; owner, Benjamin Wallace, 91 Horatio St.; architect, Samuel Bennett; builders, John Wallace & Co.

Ave. A, No. 1426, five-st'y brick tenement and store, tin roof; cost, $12,000; owner, Francis J. Schnugg, 225 East Tenth St.; architect, J. Kastner; builder, M. H. Schneider.

Railroad Ave., e s, 116′ w One Hundred and Sixty-sixth St., two-st'y brick factory, tin roof; cost, $25,000; owner, Richard Walter, 130 West Fifty-seventh St.; architects, Thom & Wilson; builders, Dawson & Archer and Hollister & Son.

Bulkhead at foot of One Hundred and Twenty-seventh St., Harlem River, two-st'y frame refrigerator-building, tin or slate roof; cost, $6,000; owners, G. F. & E. C. Swift, West Washington Market; architect and builder, B. F. Bailey.

One Hundred and Twenty-ninth St., n s, 425′ w Seventh Ave., 4 three-st'y brick dwells., tin roofs; cost, each, $6,000; owner, architect and builder, Wm. J. Merritt, 118 West One Hundred and Twenty-ninth St.

One Hundred and Thirtieth St., s s, 425′ w Seventh Ave., 4 three-st'y brick dwells., tin roofs; cost, each, $6,000; owner, architect and builder, same as last.

Alterations. — Plans have been completed for the altering of the premises 58 to 66 Church St., into a fire-proof building for the American Bank Note Company, at a cost of $250,000; Messrs. J. C. Cady & Co., architects; Sinclair & Wills, masons; E. Snedeker, carpenter.

Grand St., No. 490, raise two stories; cost, $2,500; owner, Samuel B. Clark, 496 Grand St.; builders, Thos. Lyons and P. O'Reilly.

Market St., Nos. 26 *and* 28, internal alterations and a three-st'y brick extension; cost, $3,500 each; owner, Aug. Marshall, 242 East Seventy-second St.; architects, A. Pfund & Son.

Pearl St., No. 499, raise attic to full story and a four-st'y brick extension; cost, $4,500; owner, Benj. Sire, 160 Fulton St.; architect, Wm. Graul.

One Hundred and Thirteenth St., s s, 100′ w First Ave., internal alterations; cost, $10,000; owners, John Dwight & Co., 11 Old Slip; architect, Emanuel Gandolfo.

Church St., n w cor. White St., raise one-st'y; cost, $5,000; owners, Wm. W., John and Emma Seymour, Larchmont, N. Y.; builders, Robert L. Darragh & Co.

East Third St., No. 345, raise attic to full story and a three-st'y brick extension; cost, $2,000; owner, Matt Meyer, 349 East Third St.; architect, Wm. Graul.

Commerce St., Nos. 20 *and* 22, repair damage by fire; cost, $2,000; owner, Solon Winterbottom, 51 South Washington Sq.; builder, J. H. Slocum.

Leonard St., Nos. 66, 68, 70 *and* 72, raise a mansard st'y; cost, $15,000; owners, Margaret L. Lee and Henry B. Livingston, Staatsburgh, N. Y.; architect, Arthur Crooks.

Philadelphia.

Building Permits.— *Watts St.*, e s, n Federal St., two-st'y dwell., 16′ x 40′: Wm. E. May, owner.

Broad St., bet. Marshall and Elsworth Sts., second and third-st'y addition to building, 20′ x 50′; A. Roelofs.

Ogden St., n s, w Twenty-ninth St., 9 two-st'y dwells., 14′ x 40′; Jos. N. Pattison, contractor.

Wilson St., No. 1026, two-st'y dwell., 15′ x 40′; A. McClay, contractor.

Brooks St., n s, bet. Fifty-fourth and Fifty-fifth Sts., two-st'y stable and carriage house, 18′ x 72′; Geo. Brooks & Son, owners.

Franklin St., w s, s Huntingdon St., 3 two-st'y dwells., 14′ x 48′; Jno. Loughran, contractor.

Nineteenth St., w s, s Dickinson St., two-st'y dwell., 15′ x 42′; Jno. S. Benson, contractor.

Randolph St., s w cor. Oxford St., two-st'y dwell., 22′ x 68′; E. Schmidt, contractor.

Moyer St., w s, s Palmer St., four-st'y addition to factory, 22′ x 50′; D. J. Getz, contractor.

Delhi St., No. 2240, two-st'y dwell., 16′ x 45′; D. C. Schuler, contractor.

Germantown Ave., w s, n Berks St., 4 three-st'y stores and dwells., 15′ x 61′; J. A. Riter & Co., contractors.

Watt St., s e cor. McKean St., two-st'y shop, 20′ x 50′; Jacob Botter, owner.

Cypress St., No. 320 four-st'y factory, 19′ x 36′; Thos. Carr, contractor.

Dauphin St., s s, w Germantown Ave., two-st'y dwell., 16′ x 48′; Jos. Lutz, contractor.

Fairhill St., No. 2725, three-st'y dwell., 17′ x 44′; P. L. Stuhlman, owner.

Reese St., No. 2726, two-st'y stable, 16′ x 30′; P. L. Stuhlman, owner.

Jefferson St., n s, e Twenty-second St., two-st'y stable, 51′ x 62′; A. S. McCord, owner.

Mascher St., w s, s Somerset St., one-st'y addition to dye-house, 24′ x 164′; Jos. Hanson, owner.

East Dauphin St., No. 611, three-st'y dwell., 18′ x 45′; Chas. M. Lentz, owner.

Seventeenth St., s Montgomery Ave., 11 three-st'y dwells., 17′ x 60′; Thos. McCouch, contractor.

Twenty-first St., s Reed St., 6 two-st'y dwells., 16′ x 38′; Wm. Forbes, owner.

General Notes.

Albany, Ga. — Two-st'y frame dwell., for C. W. Tift; cost, $4,000; Humphries & Norman, architects, Atlanta.

Bath, Me.— A residence to cost $10,000 is to be built for Mr. W. H. Swett, from designs of Mr. G. E. Harding, of New York.

Brockton, Mass. — Brockton is to have a new theatre. It will be in the brick block now in process of erection at the cor. of Main and Crescent Sts.

Chattanooga, Tenn. — Brick Presbyterian church, cost, $20,000; Bruce & Morgan, architects, Atlanta, Ga.

Cleveland, O. — A residence for the Hon. S. T. Everett, of Hummelstown, fire-proof, brownstone front, iron roof, is being built at a cost of about $200,000, from designs of Messrs. C. F. & J. A. Schweinfurth.

A residence to cost $14,000, first-story brick and stone, second story shingles, is to be built for Mr. N. S. Possons; Messrs. C. F. & J. A. Schweinfurth, architects.

Residence for W. O. B. Skinner and Mr. H. C. Polt, to cost, $9,000 and $5,000 respectively, are to be built from designs of Messrs. C. F. & J. A Schweinfurth.

Clinton, Io.— Two-st'y brick and stone house for S. B. Gardner; cost, $20,000; W. W. Sanborn, architect.

For G. M. Custis two-st'y house; cost, $16,000.

Edgewood, Ga. — Frame dwell. for Prof. Barilli; cost, $3,000; E. G. Lind, architect, Atlanta.

Englewood, Ill.— The house of C. H. Knights was planned by G. H. Edbrooke, of Chicago, Queen Anne style, two-st'y.

Fall River, Mass. — The Fall River *News* says: It is understood that about one-half of the stock of $400,000 has been subscribed toward the erection of a cotton-mill, to be under the direction of Mr. Jas. E. Cunneen.

Gainesville, Ga. — Court-house, of brick and stone; cost, $30,000; Bruce & Morgan, architects, Atlanta.

Geneva, Wis.—G. H. Edbrooke, architect, of Chicago, planned the three buildings at Lake Geneva, to be used for private asylum for care of the insane of Wisconsin; Anderson pressed-brick, interior of hard-wood finish, four-st'y each; cost, $150,000.

Kansas City, Mo. — Mr. J. W. Wahlenmaier is building a two-st'y house on Armstrong St., above Wyandotte Ave.

Kirkwood, Ga. — Presbyterian church; E. G. Lind, architect, Atlanta.

Frame dwell., for Col. Mynatt; cost, $6,000; E. G. Lind, architect, Atlanta.

Lafayette, Ga. — Brick court-house; cost, $12,000; Bruce & Morgan, architects, Atlanta.

Litiz, Pa.— Mary Dixon Memorial Chapel (Moravian) to be built of stone, and will cost about $20,000; Willis G. Hale, architect, Philadelphia, Pa.

Longwood, Mass. — A house and stable are being built for Mr. Jos. R. Winch, from plans of Mr. E. A. P. Newcomb; cost, $20,000; Mr. C. W. Bowers, contractor.

Monroe, Ga. — Brick and stone court-house; cost, $22,000; Bruce & Morgan, architects, Atlanta.

Morrison, Ill.—A church is to be built for the First Presbyterian Society from designs of W. W. Sanborn, of Clinton, Io.; cost, $12,000.

New Britain, Conn. — The Russell & Erwin Manufacturing Co. are building a brick foundry, 80′ x 230′; a new finishing-shop is also being erected, 44′ x 138′, three-st'y, and built of brick.

Newport, Vt. — A large grain elevator, the only one in northeastern Vermont, is being built here.

Oxanna, Ala. — Brick livery-stable, for Zach. Taylor, 70′ x 160′, stalls to accommodate sixty horses; cost, $10,000; Fay & Eichberg, architects, Atlanta, Ga.

Richmond, Va. — H. D. Dean, architect, of Chicago, has prepared plans for a hotel and court-house.

St. Louis, Mo.— Mr. E. A. P. Newcomb, of Boston, Mass., is the architect of a brick and frame house for Mr. Geo. O. Carpenter, costing about $18,000.

Syracuse, N. Y.— A $10,000 residence, first story of brick and stone, above shingles, is being built for Mr. Justus Saubert from designs of Messrs. C. F. & J. A. Schweinfurth, of Cleveland, O.

Topsham, Me.— An office building with hall, to cost $10,000, is to be built for Col. Wildes P. Parker, from designs of Mr. G. E. Harding, of New York.

Worcester, Mass. — Warner H. Joslyn and Asa L. Kneeland have begun the building of six $1,000 cottages, of five rooms each, on the west side of Mason St., between Chandler and Parker Sts.

Messrs. Joslyn and Kneeland have also begun the foundation for another brick three-st'y six-tenement block on the e s of Piedmont St.

Alden Thayer is building two $2,000 four-tenement houses, of wood, four rooms to each tenement.

The Swedish Baptist Society have made arrangements for the erection of a church; cost, $5,000. It will be the fourth Swedish church in the city.

Work on the foundation for the new brick extension to the Holman machine-shops is progressing rapidly. The dimensions are 64′ x 167′, three-st'y. Work on the superstructure will begin early in the spring.

Bids and Contracts.

Newport, R. I. — Bids for the new asylum-building have been opened at the City Hall. They were four in number, as follows: Charles H. Burdick, $22,300; H. Augustus Kaull, $23,600; L. D. Willcutt, $23,675; John D. Johnston, $21,248. The Committee will recommend Mr. Burdick's bid to the Council.

COMPETITIONS.

COLOSSAL STATUE OF SIR W. WALLACE.

[At Aberdeen, Scotland.]

10 Bridge St., Aberdeen, October 15, 1883.

The testamentary trustees of the late Mr. John Steill, of Edinburgh, hereby notify that they will receive models for a colossal statue of Wallace, in bronze, with basement of granite blocks, to be placed on the mound in the northwest part of the Duthie Public Park, near the city of Aberdeen, in conformity with instructions left by Mr. Steill, at a cost not exceeding £3,000.

Intending competitors, on application, accompanied with a remittance of 10 *s.* 6 *d.*, to Mr. John Otto Macqueen, 10 Bridge Street, Aberdeen, will be supplied with copies of (1) Mr. Steill's instructions, (2) conditions of the competition, and (3) lithograph plan of the Duthie Park, showing sections of the mound.

The author of the accepted model will be employed to execute the work, and the author of that next in order of merit will receive a premium of £50. The trustees do not, however, bind themselves to accept any of the models.

All models must be in conformity with the above conditions, and must be delivered in Aberdeen, free of expense, addressed to Mr. J. O. Macqueen, Municipal Buildings, Aberdeen, **not later than July 1, 1884.**

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MONUMENT.

[At Milwaukee, Wis.]

The committee in charge is now prepared to receive designs and proposals for the erection of a granite monument on the lot in Forest Home Cemetery, in memory of the victims of the Newhall House Fire. The cost of the monument must not exceed $3,000, including the lettering on the monument of the names of the victims.

The foundation will be laid even with the surface of the ground, at the expense of the committee.

The monument is to be erected as early as possible in the season of 1884, and designs and proposals should be sent in **not later than the first day of January, 1884.**

The committee reserves the right to reject any or all of the designs or proposals submitted.

Proposals may be sent to, or any further information obtained from,

WM. P. McLAREN,

414 Chairman Committee, Milwaukee, Wis.

PROPOSALS.

PUMPING ENGINES AND BOILERS.

[At Catskill, N. Y.]

Catskill, N. Y., November 12, 1883.

The Board of Water Commissioners of the Village of Catskill, N. Y., will receive bids **up to 3 o'clock, P. M., December 3, 1883,** for two pumping-engines and boilers complete, of the capacity of seven hundred and fifty thousand gallons each per day.

Plans, specifications and requirements can be had on application at the office of the Engineer.

The Board reserves the right to reject any and all bids.

E. LAMPMAN, President.

W. S. Parker, Engineer. 413

GAS-FIXTURES.

[At Charleston, W. Va., and Topeka, Kan.]

Office of the Secretary,
Treasury Department,
Washington, D. C., November 5, 1883.

Sealed proposals will be received at this office **until 2 o'clock, P. M., of Monday, November 26, 1883,** for manufacturing, delivering, and placing in position in complete working order, certain gas-fixtures for the United States court-house and post-office buildings at Charleston, W. Va., and Topeka, Kan.

Upon application to this office, detailed information will be furnished to all manufacturers desiring to submit proposals.

The Department reserves the right to reject any or all bids or parts of any bid, and to waive defects.

H. Q. FRENCH,
Acting Secretary.

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CONCRETE SIDEWALKS, GRADING, ETC.

[At Philadelphia, Pa.]

Public Buildings, Pennsylvania Square.

Sealed proposals will be received at the office of the Commissioners, in the buildings, **until 12 o'clock, noon, of Tuesday, December 4, 1883,** for all the grading, concrete and permanent covering required for the sidewalks on the east, south and west fronts of the buildings.

The covering must be of suitable and well-approved materials, natural or artificial, laid in the best manner, complete.

Each proposal must be accompanied by a sample of the material proposed, together with description in detail of the manner of laying, and, if artificial, of its composition, and places and dates where and when used.

Full particulars as to form and every detail and requirement of the proposals, with the necessary blanks and envelopes, may be had on application at the Architect's Office in the Buildings, second story, south front.

The Commissioners reserve the right to reject any and all bids.

By order of the Commissioners.

SAMUEL C. PERKINS, President.

Attest: F. Dehaes Janvier, Secretary. 414

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

THE most noteworthy death of the past fortnight is that of Sir William Siemens, who suffered a rupture of the heart from a fall in the street near his house in London, and survived the injury only a few days. The deceased, it need hardly be said, was one of the best known and most distinguished scientific men of the day, sharing his reputation also with his three brothers, and sharing in theirs in return. Of the three members of the great firm of Siemens Brothers, all of whom were born in Hanover, Sir William was known as the "London Siemens," Werner, an inventor of equal rank, living at Berlin, and Carl, the youngest of the family, representing it at Saint Petersburg. The establishment of the London house followed the visit of William to England for the purpose of patenting and introducing a process for electro-plating, discovered by himself and his brother Werner, and a differential steam-engine governor, also perfected by their united efforts. Soon after the naturalization of the younger as a British subject, the brothers published their invention of the so-called "anastatic printing," a sort of lithographic process in which plates of zinc were employed instead of stone. This process, although interesting, never came into extensive use, but a few years afterwards Sir William introduced the device invented by himself and his brother Frederick, which, under the name of the Siemens regenerative furnace, produced a change in the art of steel manufacture second in importance only to that which followed the invention of the Bessemer converter. The Siemens process with its modifications brought wealth and fame to its inventors, who, like true men of science, employed their increased resources in further efforts for the improvement of metallurgical and engineering practice. Within the last twenty years, the attention of the firm has been more particularly directed toward electrical science, and the members have pursued unremittingly those private investigations which have at once placed them among the foremost of electricians, and have enabled them to undertake the manufacture of electrical apparatus and machinery on a great scale. Most, if not all the telegraph cables now in successful operation under the Atlantic, besides many in other places, were manufactured by the Siemens Brothers, who built for themselves the celebrated steamer Faraday, expressly for use in laying submarine cables. More recently, the firm has interested itself in electric lighting, and the transmission of electric force to moving locomotives, the electric railway exhibited at Berlin, Paris and London having been of its manufacture. It is hardly necessary to say that many special honors followed so brilliant a career, Sir William Siemens, besides the dignity of knighthood, having received many medals and decorations from public and private authority, and holding at different times the presidency of the British Association for the Advancement of Science, and the Society of Telegraph Engineers.

THE coroner's inquest in the case of the catastrophe at Madison, Wisconsin, has arrived at a conclusion different from that of the official commissioners. An architect who took the trouble to come from Minnesota to examine the scene of the calamity testified before the jury that in his opinion the fall of the structure was due to the failure of the brick piers upon which the columns rested which supported the floors and roof of the ruined building. The earlier descriptions of the occurrence stated that one of these piers had cracked badly a day or two before the fall, and that the column above it was shored up, and the defective brickwork removed and replaced with new work, and the jack-screws immediately lowered, so as to bring the weight upon the freshly-built pier, but later accounts seemed to indicate that the iron columns alone were defective. The witnesses before the jury, however, agreed, in regard to the latter, that while the quality was poor, they were strong enough for their work; and that the examination of the ruins showed the fractures in them to have occurred at the time of their fall, and to have been caused in all cases by striking against some hard object, and not, so far as could be seen, in any instance by crushing. Between these conflicting opinions we can do nothing but reserve our judgment. In the absence of any evidence whatever, we should be more disposed to attribute such a failure to the weakness of a pier than to that of a column, for the reason that a much smaller factor of safety is generally used in calculating the strength of brickwork than that of cast-iron; or even, we fear we must say, because some sort of calculation is almost always gone through in proportioning iron beams and columns to their work, while brick piers are often planned and built without any attention to the strains which they will be called upon to resist. If a more serious inquiry should follow the inquest, as may happen if damages are demanded by the representatives of the injured men, there will be an opportunity for determining this point with certainty. Fortunately, the resistance of brickwork of any given kind is easily determined, and a few moments of calculation would show whether the piers were designed of sufficient size to carry safely the proposed load upon them.

A PANIC seems to have fallen upon the unfortunate committee charged with the duty of raising money to build the pedestal for the great statue of Liberty, at the news that the statue is completed, and will in about two months be safely packed and on its way to this country in the ship provided by the French Government for its transportation. Up to the present time, out of the two hundred and fifty thousand dollars which the pedestal will cost, only ninety-four thousand have been subscribed, and all of this that is available will be exhausted in paying for the concrete footings which have been put in place for the pedestal to rest upon. No contracts have been made for the stone-work of the pedestal itself, for the reason that no funds were in hand, or in prospect, for paying the cost, and as the stone must be quarried and cut, even after contracts are made, the great statue, after its arrival, must be ignominiously packed away to await the opening of those founts of generosity which the New Yorkers seem so surprised to find closed in other people. The latest proposition for raising money is rather characteristic of all the proceedings thus far. Some one having suggested that the inhabitants of the high land along the Brooklyn shore of New York harbor will be able to see the statue from their windows, an appeal is to be made to them to contribute liberally in recognition of this privilege. As the number of dwellings on Brooklyn Heights, from the windows of which the statue will be visible must be considerably under three hundred, the cost to each householder of his view of it would be, on this theory, at least five hundred dollars, and it may be doubted whether the committee will not find that the Brooklyn people would prefer a good statue of their own, at the same price. The plain truth appears to be that the pedestal, if it is ever to be built, must be paid for by those for whom the statue was made, the citizens of New York. The process of collecting a quarter of a million dollars by hanging contribution boxes on the bridges to receive the half-dimes of the multitude is a slow one, whatever advantages it may have in other respects; but slow as it is, it seems likely to prove more rapid than that which seeks to gain its object by persuading the people of Chicago and Connecticut that they ought to pay the expense which those of New York would like to avoid.

FIRE broke out in a hotel in Elizabethtown, Kentucky, a few days ago, at about three o'clock in the morning, followed by the somewhat unceremonious leave-taking on the part of the guests which is usual and necessary in American

hotels under such circumstances. The more deliberate persons stayed long enough to twist their bed-clothes into ropes and lower themselves into the street, while others simply jumped out of the windows, breaking their limbs in so doing. No attempt was made by any of the occupants of the building to save their clothes or valuables, and in fact, without that, their utmost agility proved insufficient to enable all of them to escape, a falling wall having buried two. The loss on the building and contents is estimated at sixty thousand dollars, so that the cost of this deadly trap must have been quite sufficient for the construction of a strong and incombustible structure, in which generations of guests might find comfort and safety. That the hotel was of the former sort, instead of the latter, is due, as every architect knows, to the effect of insurance, or, we might almost say, to the influence of insurance companies. If there were no such thing as insurance against fire, it need hardly be said that the owner would have built his house so as to insure itself, by making the walls solid with masonry, and substituting thick timbers for unsubstantial boards; but no sooner is this risk assumed for him than he turns his ingenuity to the discovery of means for lightening and cheapening the building, to save money for gilt wall-papers and tawdry carpets for the interior. In the end, the community, and particularly the careful persons in it, who pay an exorbitant price for their own insurance and a large portion of that of their reckless brethren in addition, suffer by this artificially cultivated carelessness, but no one seems yet to have thought of invoking the aid of the public authority in defence of better methods of building against the systematic policy of underwriters. Whether it will ever become necessary to do so, and if so, how to accomplish the end, are questions which will become important before many years.

WE are very glad to get some further information in regard to the Pullman sewage-farm from the *Sanitary News*, of Chicago, which makes a positive statement, on the authority of the superintendent of the farm, to the effect that the return from the produce this year will, when all is sold, amount to about twelve thousand five hundred dollars; and that the cost of carrying on the farm for the year has been eight thousand dollars, leaving a net profit of forty-five hundred dollars as interest on an investment of eighty thousand dollars, which, as we infer from another article in the same journal, includes the cost of the land for the farm, sewers, pumping works and distributing pipes. This certainly seems a most encouraging exhibit; and if we were quite sure that the cost of pumping the sewage was included in the estimate of operating expenses, and that the outlay of eighty thousand dollars covered, if not the whole of the fifteen hundred acres which were, we believe, secured for farming purposes, at least enough for permanent utilization of the sewage of a town of the present population, we should say unhesitatingly, as we suggested before, that the account of the Pullman sewage-farm is one of the most important documents ever presented to the world. The *Sanitary News* goes on to say, that in the superintendent's opinion the cost of carrying on the farm was greater this year, and the profits less, than might reasonably be expected for the future; and judging from the results of the present season, the net profit next year will be eight or ten, instead of five and one-half per cent on the investment.

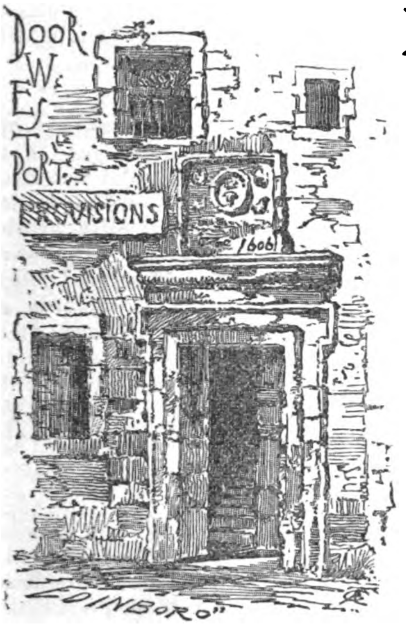
SOME singular stories are told of the construction of the new Palace of Justice, at Brussels, which is now approaching completion. The design of the building was the cherished ideal of the celebrated architect Poelaert, who died three years ago, leaving, however, well studied drawings for nearly every detail of the vast edifice. So long and earnestly had he thought over the problem that he is said to have fixed upon the general design, and even to have worked it out in plan and elevation, long before the question of building such a structure had even been discussed, and when the time came, his scheme was all ready for putting into execution. As carried out, his plan is a very magnificent one, the situation, on the top of the highest elevation in the city, helping to make the building one of the most imposing in Europe. Considering that the original estimate of cost was less than two million dollars, and that nine millions have already been expended upon it, with the prospect that another million will be necessary to complete it, one may be excused for doubting whether the structure may not be a little too imposing for its purpose, and the Belgian attorney-general, who replied to the congratulations of the King upon the completion of so magnificent a temple to Justice, by asking whether it might not rather be called a temple erected to Architecture, probably expressed the feeling of a good many of the tax-payers.

AN election was recently held at Paris, by the Academy of Fine Arts, to choose a new foreign member for that branch of the Institute of France, in place of the late Baron Ferstel, of Vienna. Several names were presented, the first among them being that of the Chevalier da Silva, architect to the King of Portugal, and President of the Portuguese Society of Architects and Antiquaries. The other candidates were M. Mercuri, an engraver, of Rome; M. Monteverde, a sculptor, also of Rome; M. Hansen, architect, of Holland; and M. Joseph Geefs, sculptor, of Antwerp. To us the selection of names seems rather a singular one, but it is impossible, at this distance, to judge of all the circumstances. The result of the balloting was the election of M. Mercuri, by twenty-seven votes out of thirty cast.

LA SEMAINE DES CONSTRUCTEURS publishes a sketch of the street front, unfortunately without the plan, of some pretty little "hotels," — a "hotel," in Paris, meaning a private house of a certain distinction, although its dimensions may be very modest. In the present case two of the houses, out of a group of five, would be considered small even by Philadelphians, whose love of home is strong enough to attach itself to a very snug domicile; but the skilful planning of the French architects seems to have made the most out of the space in the way of convenience, while their trained taste has succeeded in imparting to the façades a picturesque interest which few houses in any of our cities can claim. Each of the two smaller buildings is two stories high, with a mansard roof above, and measures twenty-seven feet in front by thirty in depth, with an extension in the rear fourteen and a half by eighteen feet. In this space are contained a kitchen, with the usual storerooms and cellars, a dining-room and parlor, with the hall, a billiard-room, bath-room and eight bedrooms. The rear rooms, like those of all the best French houses, look out on a little garden, which is furnished with a piazza opening from the dining-room. It is hardly necessary to point out that the plan of dividing the rooms between the main body of the house and an extension, which is very common in the large New York mansions, and also, in a modified way, in Philadelphia, is particularly useful for smaller dwellings. In such houses as this, only thirty feet from front to rear, the air can draw through at all times, and the close and dark interior rooms of our sixty-foot city houses are replaced by wholesome and well ventilated space.

IT may interest some persons to know that the market value of mountains seems to be declining; at least, the most famous and beautiful mountains in the world, including the land about them, can now be bought for much less than they would have cost thirty years ago. This curious fact is attested by statistics gathered under the direction of the French Government in regard to the present value and productiveness of rural land in all the departments of the country, together with the fluctuations in value, as shown by actual sales, of all property not built upon, within the past thirty years. The total value of the agricultural land in France, at the present estimates, is found to be about twenty thousand millions of dollars, the average value per acre being about one hundred and fifty dollars, but varying from three thousand dollars in the Department of the Seine, where the ground is very closely cultivated, to thirty in Corsica. In all the fertile districts the price of arable land has risen more or less in thirty years, the average value of that in the Department of the Seine, exclusive of Paris, being more than ten times as great as it was in 1853. The land rated next in value to that of the Department of the Seine is contained in the districts along the Mediterranean coast, showing that scientific cultivation and a favorable climate have made the olive orchards and flower fields of that region nearly as profitable as the market gardens of the suburbs of Paris. The only exceptions to the general advance are found in the Departments of Haute-Marne, Ardèche, and Drôme, of which the two latter lie in the rugged region about the lower Rhone, while the former comprises the hilly country of upper Champagne; and in the mountainous Departments of Gard and Hautes-Alpes.

A DERRICK ACCIDENT AND ITS CAUSES.[1]



In the *Architect* (London) of March 17, 1833, an *accident* at Reading to a derrick-crane is reported; the report of the evidence tended to show that no allowance had been made for the extra strains produced on the structure by violent gusts of wind, and that there was not sufficient provision made in the design of the Gabbert to counteract the lateral thrust of the loaded jib, and the accidental and unavoidable oscillations produced by the sudden arrest of the momentum of a swinging load, and that the stages which were of the ordinary type should have been braced in not less than three directions by diagonal ties. The platform was sixty-three feet above ground. The jib was sixty feet long, and had an inclination of 65° at time of accident. It must be borne in mind that all this staging, derrick, engine, etc., are erected complete in advance of the commencement of the building, indeed, before the foundations are begun; that the wind exerts on it an enormous leverage before the walls are high enough to lessen the exposure. It was stated that the load (35 cwt.) at time of accident was suspended at forty feet horizontally from the pivot, and that in this position the crane was calculated to safely sustain and swing a load of three tons (60 cwt.); that it had lifted and set in position fifteen similar columns the previous day, and had the sixteenth column suspended and at rest the next morning when a severe gust of wind struck it, giving a "rick" to one of the side stages which, causing part of the crane to get out of plumb, the iron foot-pivot of the upright was thereby snapped, and the whole erection collapsed. It was also stated that the sixteenth column required the jib to be in a different position from those required by the previous fifteen columns, and that the sixteenth position was its weakest. The maker estimated that the 35 cwt. load in this position of jib produced a cross-strain of nearly three tons on the upright pivot. There is evident disparity in these elements of the problem, as they do not furnish the precise data for the results stated; thus, the 65° inclination from vertical of the sixty-foot jib would give a horizontal projection from upright pivot of fifty-four feet, but if forty feet projection be taken as ruling element it would give an inclination of 42°. Then, again, 35 cwt. vertical load, in order to produce a horizontal component or thrust against the swinging pivot of the upright of three tons (60 cwt.), would require an angular inclination of jib of 60° from vertical. The vertical height of jib-head would thus be thirty feet above the stage platform; the horizontal projection of jib would be fifty-two feet (the weight of derrick, hoisting-tackle, etc., not considered).[2]

Again, briefly consider the elements of stability of an independent braced-pier standard, six feet square and sixty-three feet high, weighted down by a load piled on a frame on the ground level, and attached to cross-beams on top by means of an iron rod or chain acting axially on the structure. It is evident that the stability, roughly considered, is the ratio between the horizontal and vertical leverages. Thus, as the weighted anchor-chain acts from the central axis towards the sides of the standard, only the radius or half side of square, three feet, opposes the vertical height or leverage of sixty-three feet, considering the force of horizontal thrust to act at height of stage platform; therefore $\frac{63}{3}=21$; *i. e.*, a horizontal force of one ton acting at sixty-three feet high will require a weight of twenty-one tons acting centrally on left square pier to merely *balance* it (without any marginal allowance for *assumed* safety). Again, if we assume that the weighting material to be brick-bats, as used in this case, weighing in round numbers, one hundred pounds per cubic foot of piling space, and as they are usually piled up within the cage, say six feet square, it would require a pile twelve feet high to barely counterbalance one ton *thrust* at sixty-three feet above ground. Again, if we consider the sufficiency of the anchor rods, — the usual *safe* tensile strain allowed in England on common iron is five tons per square inch of section, or about one-fourth of breaking strength. Iron will stretch on an average about one ten-thousandth part of its length for each ton of tensile strain per square inch of section up to its elastic limit, which is nearly half of its ultimate strength, *i. e.*, about one-twelfth of an inch for each ton of strain, which for twenty-one tons would be one and three-fourths inches. So much extension of the anchor-rod produced by one ton horizontal thrust per square inch of section, would be liable to cause displacement of lines of normal stability, and cause an initial yielding movement which would enormously increase the resulting strains, and thereby cripple its rigidity. If a chain did the anchoring the elongation would be still greater. The ultimate strength of common chains is only about fourteen tons per square inch of section of both parts of link up to one inch diameter in the single part (average new iron, and one continuous rod are here considered), without any joint-eyes, hidden flaws, and with sound forgings; but practically, with ordinary samples of commercial iron rod or chain from retail stores, which have seen, too, several years' service on previous jobs, exposed to corroding and crystallizing influences, and bearing in mind that jobbing forge-work, etc., is not faultless, the above estimates would require to be modified according to the *real, not nominal* conditions of the materials employed in any particular case considered. We may also note in passing the independent stability of the central stage; it was twelve feet square and sixty-three feet high, hence $\frac{63}{6}=10\frac{3}{6}$ ratio, therefore, one ton horizontal thrust at the level of the platform would require an *axial* load of $10\frac{3}{6}$ tons on the stage to merely counterbalance it; but the weight of the engine and derrick was nine tons, and, therefore, the central standard had not sufficient independent stability to withstand in its weakest direction one ton of horizontal thrust applied at the level of the platform (the engine was not bolted to platform), without reinforcement from back-stay standards, or shore braces spreading beyond the base of the standard.

Then again, as to what additional thrust the load swinging from the jib-head would have in producing horizontal movement: the dynamic element is involved, *i. e.*, rate of motion x weight of load, and called momentum, or what some would understand by impetus. Suppose in round numbers that the force with which the 35 cwt. load would swing, if the jib were suddenly stopped, would project it, say, 30° beyond a plumb line from jib-head; this would produce a horizontal component of 20 cwt. (= 1 ton), and if this occurred while the jib projected 40 feet in the direction of 130° on Figure 3, it is evident there would be a large amount of leverage action tending to overturn or twist the structure; the moment of which is expressed by 1 ton × 40 feet = 40 foot-tons. We have already shown the principle that the thrust or horizontal component produced by 35 cwt. load on a jib depends on its inclination; if, therefore, the head has 40 feet projection beyond its foot, it would develop a horizontal force of say 40 cwt. (= 2 tons), tending to overturn the structure, and acting at top of upright, or say 25 feet above platform. Of course we only speak in general terms, as our present object is not to investigate the strains upon the different parts of the combined structure, but rather to call attention to the fact of the great development of strains to which those are liable under certain conditions, with the view of guarding those who undertake to manufacture these cranes, while a novelty, ought to do so under a full knowledge of the maximum strains which their use is liable to involve. The proper investigations of the strains will have to form a separate chapter at a subsequent time.

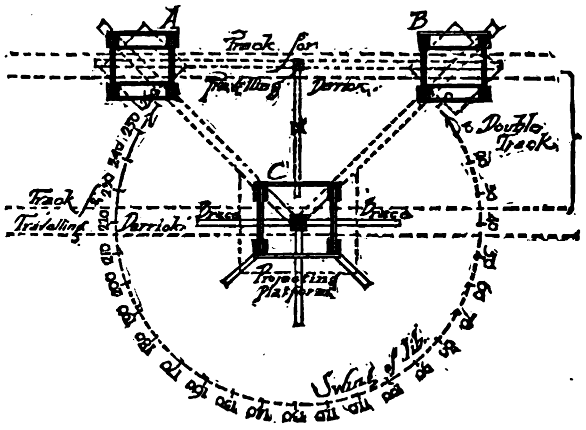


Fig. 3.

In the meantime we may further note that if the derrick-crane were bolted and fastened by dog-irons, etc., to the Gabbert-scaffold, and assumed to form an integral part of it, the elevation of the jib-head above the stage-platform at which the load is suspended must be added to the height of the platform; assuming the projection of the suspended load to be 40 feet as stated, the extra height of jib will be 45 feet, which added to 63 feet height of platform, makes a total leverage height of (63′ + 45′ =) 108 feet to be counteracted by the stability at the ground level.

Again, if we consider the breaking compressive strength of white-pine braced-pier standards of four posts, each composed of 2″ x 7″ stuff, doubled, divided into 10-foot vertical panels, it would only be 12 tons for each cage; but the total load of the weighted frame would only produce its maximum compression on any part of the braced pier when it should be tilted by side thrust, supposing the pier to remain rigidly in its normal shape, which it would hardly do under such a strain, with ordinary construction of bolting in timber, etc., as usually adopted for such structures.

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[1] Continuation of the "Gabbert Scaffold," page 208, No. 410.

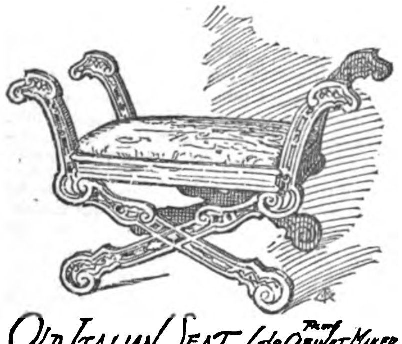
[2] A method of finding these strains, etc., graphically has been briefly considered in "Builders' Scaffolding," XIV, article 54, in connection with the two preceding articles. By the same simple method it will readily be found that the horizontal component produced by 35 cwt. vertical creates an oblique strain (in the direction of the inclination of jib) of 70 cwt., so that the hinge-pin of the jib should be proportioned accordingly.

An examination of plan of scaffold, Figure 3, in connection with the circular range of the jib shows certain parts of the circle in which the horizontal thrusts of a loaded jib are not so well counteracted as others. Assuming the range to be 260° as marked — though it will depend upon the spread of back-stays — it will be observed that when a jib is brought close against the back-stay *A* or *B*, or pointing towards 85° or 175° directly opposite, the thrust acts diagonally against the square plan of braced piers; but as there is no *internal* diagonal bracing in the pier, the resistance it offers is a double-angle diagonal, which is rather disadvantageous, *i. e.*, the diagonal does not act in any normal plane in which the line of action of thrust takes place, but at a horizontal inclination to it of 45°, and at the same time at a vertical inclination to it of 60°, which is sometimes called the bracing-angle. There is, therefore, the greater necessity for effectual lattice-bracing between the central standard *C*, and the two side standards *A B*. The dotted position of the side standards, which corresponds to those shown in elevation in Figure 1, page 207, has advantages, because the additional directions in which the planes of their panel-bracing lie, being diagonal with regard to the central standard, thus make four bracing vertical planes in which to meet horizontal thrusts, and also react directly to reinforce the lattice-bracing between the standards. The shore-braces shown around central standard at the corners are in these directions. Between these bracing-planes there is a more or less varying degree of effectual reaction against thrusts. Thus (1) from *A* to 40°, and from 175° to 220°, being the spaces between two consecutive bracing-planes; (2) from 40° to 75°, and from 220° to *B*, being another space; (3) from 75° to 130°, and their opposite points, being another intermediate space; (4) and from 130° to 175°, and the opposite points, another intermediate space. The planes being situated in the directions (1) *A C*, 175°; (2) 40° *C*, 220°; (3) 85° *C B*; and (4) 130° *C*. The shore-braces in the directions of 40°, 85°, 130°, 175°, and 220°, react against thrust of jib, and steady standard *C* against oscillations due to working of crane, etc.

The triangular plan of a Gabbert-frame is that which is least liable to change of form, provided the stiffness of the timbers of the frame, and their connection together are sufficiently strong, and hence possesses elements most requisite for obtaining stiffness, and if the vertical leg-standards, or braced piers are made correspondingly rigid by effectual bracing, anchoring, and shoring, the combination is the most simple and economical; and hence the oscillatory movement of a loaded jib or wind-force would *tend* to move the triangular frame bodily in the direction of its action; but as the derrick stands upon the central standard, which is braced independently by shores, the *main* tendency of movement will be to overturn it about base of *C*, in all directions within the range of the swing of jib; and also tend by its radical leverage to produce a rotary or twisting movement at the base of the three standards; the anchoring of standards *A B*, *tending* to counteract this tendency more or less effectively according to the degree of the angle of the thrust in relation to position of *A B*. Slight oscillations would create enormously increased strains.

NEW BOOKS.

MOST of our readers are aware that important experiments have been made in this country within the last ten years, on full-size specimens of iron, steel, and timber, the results of which tend to modify considerably our formulæ for the strength of these materials. The records of these experiments are mostly in reports not easily procurable, and even those fortunate enough to possess them find that much labor is necessary in tabulating and comparing the results, before practical formulæ can be deduced from them. Therefore the hope has often been expressed that some able and patient investigator would perform this labor and present us with the information in a condensed and practical shape.



OLD ITALIAN SEAT (From The CABINET MAKER.

Professor William H. Burr has taken upon himself this task, and the result of his labors is before us.[1]

The work, which contains the results of the best European experiments, as well as the American ones mentioned, is divided into two parts, "Rational" and "Technical." The author wards off criticism from the first part by informing us in the preface that it is intended for "few others than technical students;" but for the second and practical portion he makes no apology. Its scope may be understood from the headings of the chapters: Tension, Compression, Long Columns, Shearing and Torsion, Bending, Connections, Working Stresses and Safety Factors, The Fatigue of Metals, The Flow of Solids. In the chapters on Tension, Compression, Shearing and Bending, the author treats in succession of wrought-iron, cast-iron, steel, other metals, cement, brick and stone, and timber, and this systematic arrangement renders the book convenient for reference.

The chapter on Long Columns is very complete, both in the tabulated results of the latest experiments and in practical formulæ deduced from them. Under the head of "Bending" the author gives valuable information on the strength of rolled and built beams. The chapter on Working Stresses contains extracts from the specifications for some twelve important bridges, which illustrate in the clearest and most practical way the practice of the best American engineers.

In view of the increasing use of steel in place of iron, the author might have given more information on the effect of chemical composition on its strength and elongation. Under the head of cements, mortars, etc., no mention whatever is made of lime-mortar, or of the strength of masonry; but this may be because nothing new has been learned concerning them during the last ten years. The author has apparently gathered together the results of all the recent experiments made in this country on the strength of materials, and we know of no other work which gives such complete information on this subject.

We cannot let this occasion pass without making a mild protest against the use of the word "*eye*-beam," which occurs in the above work and also in the handbook of Carnegie Bros. & Co. We hope that the day may come when the English language can be spelled as it is pronounced; but until that time arrives, it is important to preserve the distinction between an eye-bar, which is a bar with an *eye* in the end, and an I-beam, which is a beam whose section has the *shape of a letter* I. We read in the Scriptures of a man with a beam in his eye, but have yet to find an eye in an iron beam. If it is allowable to spell I-beam "eye-beam," then we may expect to have this shape, T, designated as a *tea*-iron and this, U, as a *you*-shape.

At first sight it seems a little strange that an architect almost never gives a thought to protecting city buildings from lightning, while it is sure to be one of the considerations attaching to the planning of a country building, and the proper steps to be taken often form a part of the original specification, and their execution is watched with anxious care. It is not that electric discharges occur less frequently over cities than over open stretches of country, and it may well be that a city may lie in the regular pathway which recent Austrian researches show electric storms habitually take, and yet escape injury, while isolated objects in the country in the range of the same storm are blasted.

A moment's thought, however, explains this immunity. In the first place, there are the great number of factory and mill chimneys which are now-a-days almost invariably properly protected, and from their great height afford ample security to buildings lying within a considerable radius from them as centres. Then, nowhere than in cities is there better earth-connection to be found, since, if one decides to rod his building, and can make his earth-connection by securing the rods to the city water-mains, he need give himself no further thought on the matter, other than to occasionally assure himself that his rods do not rust out at the couplings, or are not fused by some known or unsuspected discharge. But there is no absolute need of employing rods, since the greater part of the roofs are covered with metallic roofing, connected with the ground by metallic rain-water conductors, themselves connecting directly with the sewers — which do not form a bad earth. Even if the roof itself is not tinned, the building is not unlikely to have a metal cornice connected by rain-water leaders with the ground. Besides these, and the iron-fronted buildings, and the net-work of telegraph and telephone wires, which by themselves would probably protect a city, there are the thousands of soil-pipes rising above the roofs, each having an earth in the sewer, and indirectly, through the connecting plumbing, with the city water-mains. So, except in the case of churches and other lofty buildings, the architect building in the city need not necessarily concern himself with the electric protection of his building.

But in the country it is different, and though, owing to the faith we have in the doctrine of chances, we are far from believing it is absolutely necessary to rod a building, yet clients often have a prejudice in favor of securing a mental relief, even if they cannot assure themselves of a physical protection, by placing rods on their buildings, and as we are well assured that an imperfect system of conductors is more dangerous than no rods at all, we will recommend all architects who do not feel sure that they have already mastered the principles of electric protection to procure Mr. Spang's admirable little treatise[2], and spend an hour or two in studying it.

The principal requirements of good protection are conductors of proper size and sufficient conductivity securely attached to the building,— not insulated from it,— and to which all the metal-work of the building is attached, so arranged, too, as to offer no chance of short-circuiting, and ample earth-connections. This last requirement is easily stated, but is the most difficult of all to properly satisfy; indeed, in the face of recent French investigations (see *American Architect*, page 221, No. 358) it seems so hopelessly expensive a task to provide a *perfect* earth that it seems hardly worth while to attempt to do anything, unless the building stands on the bank of a stream or pond. To make an absolutely perfect earth in some of the arid situa-

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[1] *The Elasticity and Resistance of the Materials of Engineering*, by Wm. H. Burr, C. E. John Wiley & Sons: 1883. Price, $5.00.

[2] *A Practical Treatise on Lightning Protection*, giving complete and explicit Instructions for the Protection of Buildings, and explaining the Defects of the Lightning Conductors now erected. By Henry W. Spang. With Illustrations. New and revised edition. New York: D. Van Nostrand, Publisher, 1883.

tions that architects have to build in would almost require the wealth of Crœsus drawn from the purse of Fortunatus. Fortunately, however, electric discharges occur most frequently during the fall of rain, and Mr. Spang has devised an earth-connection which seems to offer good security against any discharge which takes place during such fall of rain. He takes an iron pipe ten feet long with an inside diameter of two inches, and a shell one-quarter of an inch thick, which has been perforated on two opposite sides by quarter-inch holes about ten inches apart. This he buries upright near a rain-water leader, which may discharge directly into it, and connects the lightning-rod to it. In this way an area of moistened ground is formed around the earth-connection proportionate to the length and severity of the rainfall. Moreover, that the ground may never be wholly dry at this point, he connects with it the overflow from some neighboring hydrant or horse-trough.

To conclude, we would say to any architect who thinks of putting conductors on his building: Do not do it unless you thoroughly understand the principles of electric protection sufficiently, at least, to form an intelligent opinion of the method the "practical lightning-rod man" proposes to employ, and to correct any error of judgment on his part by pertinent criticism and advice.

PAINTING is one of the many things that an architect is expected by his client to be thoroughly posted on, and certainly for his own comfort he should be. Yet how many architects are there who understand the matter? It is easy enough to specify "two-coat" or "three-coat" work, and to remember what parts of the building it is best to have treated in one way or the other; and to superintend the painting, so far as to make sure that wood is primed only when thoroughly dry: that it is properly rubbed down and filled is also comparatively easy, but to superintend the mixing of the paints, to be able to detect and condemn inferior and adulterated oils, to be sure that the lead is not mainly barytes, to be able to take the paddle yourself, and by a real knowledge of the properties of pigments to mix a tint that you desire to obtain, to know what of the many brands of "ready-made" paint it is allowable to use; these are attainments that the architect rarely has. Yet he should have them. He should know what varnishes will crawl and crack, and what will stand; he should know about stains, about wax and oil polishes, metallic paints, shellac, and the infinite variety of pigments. And we believe that some day he will find it well for him to know these things with a scientific if not a practical knowledge, and not leave them as now entirely to the honesty and intelligence of the painter's foreman, just as now he knows more about plumbing than the architect of ten years ago ever dreamed of knowing.

Of course this knowledge must be obtained mainly through books, and though there have been some books written on the subject, they have been mainly concise practical hand-books containing rule-of-thumb directions which were uninteresting to read, and difficult to remember if not enforced by immediate practical experience. But until the book[1] under consideration was published, there was nothing, so far as we know, which treated the subject scientifically and practically *de bas en haut*. The book appears under the joint authorship of Mr. Condit, who has done the writing and the scientific investigation, and Mr. Scheller, a master car-painter, we believe, whose long practical experience lends a weight of practical authority to the views advanced. There are also incorporated in the book chapters by special authorities, such as the chapter on "Pigments" by Mr. Drummond — one of the most instructive chapters in the book, and one useful to the artist as well as to the architect and painter — and one on "Decoration by Color," by Mr. W. H. Day, which is not the less useful from its capacity of exciting opposition to the theories of color therein advanced.

The great merits of the book are its thoroughness, both scientific and practical, its arrangement, and the admirable thoroughness with which it is indexed; for besides the usual table of contents there is the not so usual alphabetical index of subjects, and a special and still more valuable "Index of Pigments." There is, moreover, a useful appendix in the form of a bibliography.

With so many excellent points, it is a pity there should be any defects, and we are tempted to make light of the confusion that sometimes occurs in the writer's sentences, and to pass over an occasional inelegance in English, and smile forbearingly at the inadequacy of some of the definitions. Still we have rarely come across a book of any sort from which we were so tempted to make copious extracts as from this, and when in running over the index our eye was caught by the great number of references under the head of "red-lead" and saw how they were scattered at intervals throughout the book, we thought we could in no better way give an idea of the thoroughness of the work, and the style of the writer, and at the same time impart much valuable information concerning a substance whose real usefulness was probably unknown to most of our readers, than by transcribing these passages: —

"The kind and quality of the color is the second and all-important quality of a pigment. It decides against the use of red lead, which in many respects is the most valuable pigment there is." — p. 37.

"Red lead is a valuable addition [to iron paints] both as a drier and as supplying the qualities (except color) which iron paints lack." — p. 41.

"When lead is heated it takes up oxygen from the air and becomes: —

		Parts.
Yellow lead	Oxygen, about	4 to 7
	Lead	93
		100

"If this yellow lead is melted, it becomes litharge. If heated to 600°, it becomes red lead, which is a compound of yellow lead and another lead which contains twice as much oxygen."[2] — p. 89.

"It is evident why lead compounds, especially litharge and red lead, act as driers: when they are heated they give off oxygen and become to oil like concentrated air." — p. 89.

"*Boiled Oil Soaps.* — Lead, manganese and zinc and other substances give more soap in boiled linseed oil because it contains an abundance of free oil acids. These are hardened by the soaping and quickly dry into hard brittle substances. Red lead gives the hardest soap." — p. 94.

"It remains to discover whether longer life is given to oil by changing it into a soap. It is, however, an advantage to get a hard paint immediately, if by so doing we can also retain the elasticity of the oil. This we accomplish by using red lead as a pigment. The red lead gives up some of its oxygen to the oil and changes part of it into an oxy-linseed-oil acid, with which the lead unites to form a hard oxy-linseed-oil acid, oxide-of-lead soap. And yet red lead is a lasting paint, long retaining its elasticity and a certain power of holding itself together, more lasting than iron paints." — p. 113.

"Mulder thus sums up the method of making a cheap, hard and well-protecting paint: —

1. By boiling oil with two to three per cent of oxide-of-lead (litharge or red lead) to harden the soft, non-drying and free oil acids.
2. Some oxide of lead as a pigment: red lead the best (uniting with and giving additional hardness to the oil.)
3. Hard, indifferent powders, made as fine as possible, and as much used as the mixture will bear as a good paint. The above seems to represent the true theory of a good paint."

"We must have for a good paint substance one which not merely mixes with, but more or less links with, the oil. Barytes does not unite with the oil; zinc does so slowly; iron paints only partially if at all; — red lead is the substance which best fulfils this office, and it is the most lasting paint. White lead, as we shall see, owes all its value as a paint (not a color) to a substance like red lead which it contains. Nevertheless red lead is the most dangerous for the painter. Moreover it is a difficult paint to obtain pure, and is more inclined to blister than are iron paints, which are also much cheaper. *We do not advocate the use of red lead*, but it is necessary to show the facts as far as they exist." — p. 115.

"Wrought-iron needs a paint hard and elastic, which will hold itself together even if points of scale give away underneath it; *hence the value of red lead on wrought-iron;* while on cast-iron other paints, iron oxides, for example, will serve quite as well." — p. 142.

The Cincinnati Southern Railroad says that "red lead has proved far the best and most lasting paint. It is difficult to obtain in purity and is more expensive than iron oxide, but so much more lasting in the climate and region through which the road passes that it is used in preference." — p. 144.

Prof. Henry L. Coulton, after three years experiments with unlimited means at his command states that he finds "nothing equal to red lead for ship iron." — p. 144.

A pump-rod in an English well two hundred feet deep and protected by red lead lost nothing by rust in forty-five years. — p. 144.

"Red lead is adulterated with brick dust and other substances and in this way has lost, perhaps, some of its good reputation. Its value is that it unites with the oil, giving up at times part of its oxygen. No other substance which does not unite with the oil can replace it. . . Spur says that should chemical action commence, red lead is reduced to metallic powder. This is possible, and it is also probable that red lead under great heat will blister sooner than iron oxide paint. Red lead has also been accused of forming a battery with iron, and rusting the iron faster by unlinking the oxygen in water. No evidence within my knowledge as to the effects of dried lead paints upon iron has appeared except as to the effects upon two vessels, and on these below their water-line. . . Above the reach of the sea-water wherever the red lead was in good condition it had done no injury. . . Our Government vessels are painted with red lead and zinc; but the favorite paint for ships' bottoms in the merchant marine is, I believe, red lead alone. Red lead gives with zinc a very hard paint. Red lead softens tin and has been accused of eating holes in it; this is not probable. It should not, however, perhaps be used on tin. . . Finally, the color of red lead is not durable, especially not with white lead. Under the action of the sun it becomes less orange; and mixed with other tints, or under the influence of sulphur gas, its color is fugitive. Again red lead is perhaps more injurious to the workman than other paints, because he must mix it with oil as it will not keep for use ground with oil." — pp. 145-6.

"Red lead forms a soap with oil and no paint is more lasting. . . Red lead, litharge, and to some extent all kinds of manganese, including umber, form soap with oil. Red lead is a good drier, both because it contains oxygen and because it thus unites with the oil." — p. 200.

"Mulder recommends red lead as giving the most elastic of all drying oils and at the same time the hardest." — p. 202.

"Oil merely heated to 212° with red lead for two hours is a quickly drying oil. . . The litharge or red lead should be thoroughly dried and ground to a very fine powder." — p. 203.

"Red lead, stability fair, strength of tone unpleasant." — p. 304.

"Red lead is composed of

Lead	91	parts
Oxygen	9	"
	100	"

"Its color is more red as it contains more oxygen. It is of great value as a paint substance, but dangerous to use because it does not keep fluid in oil, and painters, mixing the fine powder with the oil, are liable to suffer thereby. It fades in mixture with white lead, and may become less orange in sunlight, but is more often whitened by the carbonic acid of the air, which changes it into white lead. It requires less oil than perhaps any other pigment. Test very difficult. The test usually recommended has no correct basis." — p. 319.

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[1] *Painting and Painters' Materials:* A Book of Facts for Painters and those who use or deal in Paint Materials. Treating of Oils in all their relations to Paint and Colors; of Pigments, their qualities, uses, changes, adulterations, and tests; Varnishes, their materials, comparative qualities, uses in decoration, and their mysteries and changes in use; of Driers, and their effect in the drying of paint and varnish; of Wood and Iron as preserved by paint and their relations to cracking and peeling of paint and varnish: of the Management of paint-shops, carriage-painting and car-painting: of the Decoration and Use of Color; and of the Effects of Paint on Health. By Charles L. Condit, under the supervision of Jacob Scheller, master-painter. New York: The *Railroad Gazette*, publishers, 1883. Price, $2.25.

[2] Red lead contains over nine per cent of oxygen.

"Red lead is darkened by the presence of sulphuretted hydrogen or ammonia. — p. 369."

It would be a great assistance to the user of Vogdes's "*Pocket Companion,*" and a still greater one to the reviewer, if the additions and alterations in each fresh edition, "revised and enlarged" as it is said to be, were indicated either in the index or in the body of the text. In the absence of such indications, we are unable to say how this edition differs from and is an improvement over its predecessors; but as the chapter on "Limes, Cements, Mortars, and Concretes" appears in a fresher type than other portions, as also an account of tests of brickwork made by Mr. Kidder, and tests of the brick used in the Indiana State House, it is fair to suppose that these portions are new. We can only say that this little pocket price-book[1] is a useful companion, and the plan adopted of giving approximate prices only, is as sensible a method as could be adopted. But we would like to see the prices so carried out in each item that one need not have to guess whether dollars or cents were intended.

Another "pocket-book" which it is a pleasure to examine simply because of the size and clearness of the type in which it is printed is "*Dixons' Machinist's and Engineer's Calculator,*" which has no great every-day value to architects except as a source of information to resort to at those long separated intervals when some question in dynamics comes up for solution; but it has a considerable amount of useful material in a complete, but concise exposition of the rules of arithmetical procedure, begining with the elementary definitions, and explaining by the aid of examples the chief arithmetical operations. This feature of the book[2] is amplified by a chapter of "Rules and Problems" which gives a great number of solutions of a considerable variety of problems, that may occur in the practice of a mechanical engineer. The chapters on "Pumps" and "Steam Boilers" are of considerable general utility.

THE ILLUSTRATIONS.

CONNECTICUT FIRE INSURANCE COMPANY'S BUILDING, HARTFORD, CONN. MR. J. C. MEAD, ARCHITECT, HARTFORD, CONN.

The building is of the Byzantine style of architecture, of brick, brownstone, and terra-cotta, 58′ x 120′, and as shown by the illustration, one and two stories in height, with a tower, hexagonal in form, extending above the main roof. An octagonal portico, entered from Prospect Street, is partly enclosed by a screen of glass and iron between the upper portions of the brownstone columns. From this portico we enter the vestibule lighted by a large east window and an alcove, two sides of which are composed entirely of plate and cathedral glass. The directors' room, measuring 20′ x 24′, leading directly from this vestibule is lighted by a window ten feet wide, of novel construction, and is conveniently connected with the president's room and the spacious general office, 40′ x 45′, and twenty feet high. Panelled wainscoting six feet high is continued all around this room, and with the panelled ceiling in oiled butternut wood makes a very handsome finish for the apartment. A characteristic feature of the building is the vault, which is twenty feet square inside and thirty-two feet high, all parts made easily accessible by light staircases and galleries conveniently arranged.

Adjoining the vault, which is entered from the general office, is a supply-room, well-lighted, containing a coat-room, lavatory and a stairway leading to the ground floor. Beneath this room is the boiler-room. Under the general office and of the same size is the large supply and printing room, lighted by four hundred and thirty-two square feet of plate-glass evenly distributed. Three offices, 13′ x 19′, 14′ x 22′, and 20′ x 28′, are provided in the front part of the ground floor, and are directly accessible from a door at the sidewalk level on Prospect Street. Returning to the vestibule, an archway opens on the south revealing a generous staircase leading to the apartments above. The rooms throughout will be mainly finished in hard woods; the basement to be in chestnut, the general office and vestibule in oak, the directors' room and private office connected with same in mahogany and the stenographers' room in white-wood.

HOUSE OF A. H. NORDYKE, ESQ. INDIANAPOLIS, IND. MR. C. A. WALLINGFORD, ARCHITECT, INDIANAPOLIS, IND.

OLD HOUSES IN NEW ENGLAND, SKETCHED BY MR. A. H. EVERETT, BOSTON, MASS.

HOUSE AT SAN ANTONIO, TEX. MR. C. I. BERG, ARCHITECT, NEW YORK, N. Y.

HOUSE OF MRS. P. L. BENNETT, WILKES BARRE, PA. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

This house is of brick and half-timber work, the lower story of brick with stone quoins at corners, second story half-tin ber work with pebble-dashed panels. The peaks of gables are ornamented with repoussé lead-work, the roof covered with red slate. Cost, about $23,000.

OUR LAST WEEK'S ILLUSTRATIONS.

Too late to prevent the mailing of our last week's issue, we learned that, owing to imperfections in the manufacture of the paper on which the illustrations were printed, an unknown number of imperfect and inferior prints — particularly of the "Cloisters at Belem," and the "Houses on Beacon Street, Boston," — had been sent to the bindery, and had gone from thence to our subscribers. If any one who has received such imperfect or inferior prints will take the trouble to return them, we will replace them by perfect copies. To ensure against errors in making this exchange it will be well for the sender to write his name and address across the face of the rejected print.

CEMENTS.[3]

All the various kinds of hydraulic cement used on the public works are daily tested by me as to their tensile strength, and weekly reports of the results obtained, with an annotation of the points where used, have been submitted to Capt. R. L. Hoxie and Lieut. F. V. Greene, assistant engineers, District of Columbia.

Considering hydraulic cement one of the most important materials employed in the public works, I have devoted to it a great deal of time, both to ascertain the strength of the various kinds as actually manufactured, and to improve, if possible, their qualities.

Cement may be divided into two classes, the ordinary home-made and the Portland cements.

The ordinary home-made cements, such as Round Top, Cumberland, etc., which have come to the notice of the engineer department in the works of the District, are the Rosendale, the Maryland, and the Virginia cements. Although the two last named of the class designated as "slow-setting" are of but recent date, they are now manufactured very successfully in accordance with the formula given to the manufacturers by us, after a careful chemical investigation and analysis. In my last annual report to the Engineer Commissioner some formulæ were stated by which these cements are now manufactured. To-day they seem to command the market here, the manufacturers being able to furnish them at a less price than the Rosendale cement, whose qualities they even surpass, as will be hereafter demonstrated.

SETTING OF CEMENTS.

A slow-setting cement of the home-made brands, when mixed with water in a sufficient quantity at 80 ° Fahr., ought not to be "set" before the lapse of fifteen minutes.

When it is put under water immediately after setting, it should keep on setting without crumbling, and ought to bear a tensile strength per square inch of at least: —

	Pounds.
In 24 hours	20
In 5 days	60
In 15 days	90
In 1 month	150
In 2 months	250
In 12 months	300

Hydraulic cement is a double silicate of lime and alumina, and is obtained by exposing the material to a degree of heat sufficiently high to produce partial vitrification. In this condition it contains no free lime, and constitutes a slow-setting cement of the Portland class.

The tests made in my laboratory for the engineer department of the District are mechanical tests and chemical analyses: —

1. Sifting, in order to ascertain the fineness.
2. Setting, to ascertain whether quick or slow.
3. Tensile strength; and
4. Chemical analysis, — the most important proof.

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[1] *The Architect's and Builder's Pocket Companion and Price-Book*, consisting of a short but comprehensive epitome of Decimals, Duodecimals, Geometry and Mensuration: with tables of United States Measures, Sizes, Weights, Strengths, etc., of Iron, Wood, Stone, Brick, Cement and Concretes, Quantities of Materials in Given Sizes and Dimensions of Wood, Brick and Stone; and full and complete bills of prices for carpenter's work and painting; also, rules for computing and valuing brick and brickwork, stone-work, painting, plastering, with a vocabulary of technical terms, etc., by Frank W. Vogdes, Architect, Indianapolis, Ind. Enlarged, revised, and corrected. Philadelphia: Henry Carey Baird & Co., Publishers. 1883.

[2] *The Machinist's and Steam-Engineer's Practical Calculator.* A Compilation of useful Rules and Problems arithmetically solved, together with general information applicable to Shop-Tools, Mill-Gearing, Pulleys, and Shafts, Steam-Boilers, and Engines. Embracing valuable tables, and instruction in Screw Cutting, Valve and Link Motion, etc. 16mo, full morocco, pocket form. By D. B. Dixon. New York: D. Van Nostrand, Publisher. 1883.

[3] Portions of a report made by E. J. De Smedt to the Commissioners of the District of Columbia for 1882.

FINENESS.

Some experimenters have supposed that the heaviest cement is the best, and that a bushel measure filled lightly and levelled on the top should weigh 112 pounds. This weight in itself is no criterion of quality, and many cements of a high class weigh less, while some weighing even more are worthless. The specific gravity of the cement, which varies from 2.701 to 3.100, should be ascertained. The absolute gravity of a finely-ground cement will be less than that of one coarsely ground; and it is of the utmost importance that cement be ground as fine as possible — so fine that it becomes almost impalpable to the touch.

In the composition of a mortar or concrete, it is of an apparent importance that each particle of sand and aggregate is completely surrounded by a film of cement, thus uniting each particle; and it is also apparent that any two grains of sand or aggregate which are in absolute contact become a source of weakness to the mass, inasmuch as they are not cemented together, but are only held in position by their surroundings, and in order to secure the stronger position with the minimum quantity of cement, the first essential is that the cement be finely ground.

It may appear strange that after the cement has been sifted, no matter through what number of meshed sieve, the portion which is retained in the sieve has practically no setting power. This seems to prove conclusively that cement, in order to be entirely effective, must be ground to an impalpable powder, and, further, that all granulations are inert.

Independently of the power of amalgamating with and surrounding each particle and aggregate of a concrete, fine grinding improves the quality of cement itself.

In the manufacture of cement it is impossible that all the clinkers burn to an equal degree of hardness, and in passing through the millstones, the softer pieces, or those which have received the least calcination, are those ground the finest, while the well-burned clinker is only reduced to granules, not to powder. As it is the best-burned clinker which will produce the best cement, the value of fine grinding of it when well burned thus becomes a necessity.

The fineness of the cement ought to be tested through a No. 60 sieve, of 3,600 meshes per square inch, and the residue on the sieve ought not to exceed 5 per cent, and yet I find an average of 8.43 per cent in the Portland cement used, which has come under my examination.

SETTING.

A quick-setting cement will set after being mixed with a quantity of water necessary to make a stiff paste before ten minutes, and will evolve heat. A slow-setting cement requires twenty minutes to set, and even longer, and will not evolve heat to any apparent degree.

The meaning of the term "set," as used by me in connection with cement, is explained as follows: The cement is purely chemical in its action; it commences with the addition of water to the cement, and continues until the cement attains its ultimate hardness. Continuous as the chemical action may be, there are periods, however, during the early stages, that may be defined, and it is one of these periods that is meant when the term "set" is employed, as shown below.

When a sufficient quantity of water is mixed with the cement so as to form a stiff paste, pat or briquet, the first change observable is that the water comes to the surface; the next that it (the water) is absorbed by the cement, and this is the period I term "set."

This, however, has nothing to do with the hardness, as some cements may be sufficiently hard to withstand the impress of the thumbnail at that time, while others will not be able to so resist until long after.

The advantage or disadvantage of using a "quick" or a "slow" setting cement must be determined by the nature of the work for which it is required, and it is therefore impossible to say that either property is good or bad. The peculiar characteristics of them, however, are that a "quick-setting" cement will attain firm strength in a short time, but will not improve much afterwards, while the "slow-setting" kind will require more time to "set" in the beginning, and will eventually attain a much greater strength by a gradually increasing gain.

In some inferior grades of cement, the "slow-setting" property is owing to an excess of non-active silica or other foreign matters contained therein. The home-made cements are of this grade, a characteristic of which is also that it is obtained by a lesser degree of heat.

TENSILE STRENGTH.

No matter, however, what results may be obtained by the foregoing experiments and tests, after all they determine certain properties only, which a good class of cement should possess, but they give no definite information as to its strength. It is necessary, therefore, to carry on further tests, extending over any desired period, so that its strength at different dates may be ascertained and determined. The result of this test being the consequence of the chemical composition of the cement, the chemical analysis is necessarily the only foreteller of the ultimate strength of a hydraulic cement, which will be explained hereafter.

There is, perhaps, no better mechanical way of testing cement than by a tensile strain; it is easily applied and may be measured with great accuracy. This test is daily applied and recorded in the laboratory, and weekly reports made to Capt. Hoxie and Lieut. Greene, of the engineer department. Seven hundred and six tests were made during the year.

The following tables represent the average strength of the various kinds of home-made and Portland cements, at different dates, running over three years, and comprising: —

Comparative statement of the tensile strength of various brands of home-made cements.

VIRGINIA AND MARYLAND CEMENTS.

Name of brand.	At one day.	At five days.	At ten days.	At twenty days.	At thirty days.	At sixty days.	At twelve months.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Cumberland	55	85	117	192	250	305	350
Shepherdstown	20	65	94	170	227	270	300
Round Top	50	83	100	190	250	308	352
Average	42	78	104	184	242	294	334

ROSENDALE CEMENTS.

Name of brand.	At one day.	At five days.	At ten days.	At twenty days.	At thirty days.	At sixty days.	At twelve months.
Delafield & Baxter	20	55	95	145	220	250	295
Norton [1]	20	50	90	120	200	217	290
Lawrenceville	18	30	70	100	150	185	200
Average	19	45	85	122	190	217	262

Comparative statement of the tensile strength of various brands of Portland cements.

Name of brand.	At one day.	At five days.	At ten days.	At twenty days.	At thirty days.	At sixty days.	At twelve months.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Saylor's	150	250	300	340	380	450	600
White's [2] (English)	170	300	350	410	450	500	700
Crown [3] (English)	120	195	270	290	320	350	400
Imperial	115	250	300	330	350	400	640
Average	138	240	305	342	355	425	585
Stuart's [1] (English)	80	225	540	...	...	...	...
Dyckerhoff's [1] (Ger.)	100	250	550	600	700	...	...

Tests of home-made cements	1,820
Tests of Portland cements	500
Total Tests	2,320

Since the preparation of the foregoing tables, I have endeavored to find the actual strength of the Portland cement: first, with the granules and without the proper screening; second, after proper screening, leaving out the clinkers; and, third, with the clinkers or granular residue retained and properly pulverized; and after a careful experiment with Saylor's Portland cement, I find that the grade usually furnished has a breakage at 1″ x 1″ for ten days of 300 pounds. The same cement without the clinkers, when screened through a No. 60 sieve (the same as heretofore mentioned), gives for the same number of days a breakage of 380 pounds. If the granular residue, after being pulverized to an almost impalpable powder, is added to the cement thus screened, the breakage point for 1″ x 1″ at ten days goes up as far even as 525 pounds.

So far the analyses made by me of the cement stones in this vicinity, producing our home-made Maryland and Virginia cements, viz., from the Cumberland, Round Top, and Shepherdstown quarries, give positive proofs of a probable manufacture of Portland cement from some of the strata of the quarries at those locations. I am now devoting as much time as can be spared from my other duties in experimenting on these strata, with a view of ultimately arriving at the result of manufacturing right here a cement in all respects equal to the Portland cement, and at a greatly reduced cost. My tests so far induce me to hope that within a very short time the object will be accomplished, and we will no longer, for our public works, have to depend on the importation from foreign countries of Portland cement, but we will be able to produce it in the immediate vicinity of the District.

Extract of chemical analyses of the Portland cements.

Name of brand.	Loss by calcination.	Inert silica.	Granular residue by screening through No. 60 sieve.
	per cent.	per cent.	per cent.
Saylor's	1.50	1.00	20.00
White's	1.30	1.25	4.00
White's, condemned	7.00	1.25	14.00
Crown	3.00	4.00	7.00
Imperial	2.00	3.00	6.00
Stuart's	0.40	0.00	4.00
Dyckerhoff's	0.45	0.00	4.00
Average	....	....	8.43

The loss by calcination represents the absorption of carbonic acid and moisture, viz., air-slacking or imperfect calcination.

Inert silica represents so much sand.

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[1] These cements were not used in the District, but were from samples procured and sent here for comparative experiments.

[2] This cement frequently gives unsatisfactory results, even as low as 95 pounds in ten days.

[3] Condemned.

Granular residue by screening represents so much inert cement, and in effect may be considered as so much sand.

Comparing the above two tables of "tensile strength" and "extract of chemical analyses," it is at once observed that the mechanical tests and the chemical analyses will predict the ultimate results of any given brand of Portland cement.

In the foregoing the statement was made that in the home-made cements the slow-setting properties are generally due to an excess of non-active silica and other foreign matters, the addition of which reduces their tensile strength.

In order to obtain from a "quick-setting" cement a "slow-setting" one, I have tried several processes, without adding any foreign stone, introducing in the compound a relatively great quantity of inert and objectionable substances. My experiments were mostly directed towards changing the nature of the free lime, the cause of the quick setting, the evolving of heat, and the expansion of the mortar, and the researches in that direction have resulted most successfully.

Anhydrous lime, or free lime as it has hereinbefore been termed, when brought in contact with water evolves heat and expands. If this anhydrous lime CaO is changed into a bibasic carbonate of lime $(CaO)^2 CO^2$, or into hydrate of lime $CaO\ H_2O$, the addition of water will not evolve heat, and the mortar will not expand.

The hydraulic cement containing anhydrous lime CaO will eliminate heat and will expand; when this CaO is transformed into $(CaO)^2$, CO^2, or into $CaO\ H_2O$, it will be in a proper condition to combine with silicic acid SiO^3, it will not produce heat, and will not expand; it will then be a slow-setting cement, and will produce a mortar of much greater tensile strength than a cement made slow by the addition of other stones.

The desired results are obtained by the following processes: After calcining, at red-heat, limestone, hydraulic limestone, or hydraulic cement limestone, in the presence of carbonic acid, CO^2, it will be found that the carbonate of lime, $CaO\ CO^2$, in those stones has been transformed into bibasic carbonate of lime $(CaO)^2\ CO^2$.

The operation is performed in ordinary furnaces or kilns. The carbonic acid used in the treatment is obtained from the top of the furnace while the stone is being calcined. It is conducted to and injected into the material, at red heat.

The proper theory of the calcination may be thus formulated: —

$$CaO\ CO^2 < \genfrac{}{}{0pt}{}{CaO}{CO^2} > (CaO)^2\ CO^2 + CO^2$$

The hydrating process is just as effective as that above described, and has the advantage of its great simplicity.

To change a "quick-setting" into a "slow-setting," the anhydrous lime CaO is converted into a hydrate of lime $CaO\ H_2O$, which, with the other constituents of hydraulic cement, will produce a hydraulic cement that sets "slow" without heating or expansion. The hydrating of the CaO can readily be accomplished. It is found in practice, that from one to two parts of water, by weight, to one hundred parts of calcined cement stone containing an excess of free anhydrous lime will suffice to produce the desired result.

The water is combined with the cement by sprinkling it over the calcined stone coming from the kilns; it is then milled, etc.

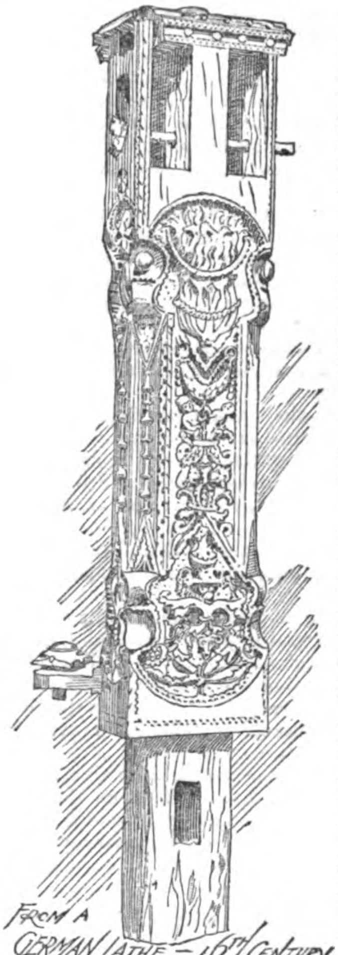
The latter process is now in operation with excellent results at the Round Top and Cumberland cement works, and, thus far, the quality of those cements has been improved at an average of 25 pounds in twenty days. This is due to the purer quality of the slow-setting cement thus obtained.

It has in the foregoing been shown that heretofore the Virginia and Maryland cements, viz., the Shepherdstown, the Round Top, and the Cumberland, were excluded from use on our public works: first, on account of their irregularity in quality; second, for their too quick setting properties. By the labors of this department, and by the advice given by it to the manufacturers of the above-named brands of cement, they have at this time been enabled to produce grades thereof far superior to the well-known Rosendale cement, as shown in the preceding table. Owing to the reduced price at which they are sold, to-day they command the market here. These brands of cements are furnished to our contractors at 90 cents per barrel of 300 pounds, while the Rosendale cement cannot now be purchased in Washington for less than $1.25 per barrel. Thus, there is a difference of 35 cents per barrel in favor of the Maryland and Virginia cements.

It may be estimated (with a very approximate degree of certainty) that 40,000 barrels, at least, of these kinds of cement are annually used on the public works of the District of Columbia. A saving of 40,000 × 35 = $14,000 per year is thus made. With great pleasure I have to state that this is simply due to the indefatigable labor of the engineer department of the District of Columbia, and it is with the greatest pleasure I take this opportunity to thank the officers of that department for the aid, encouragement, and facilities they have granted me in the prosecution of my operations.

The English Nomenclature of Lumber. — Readers of lumber journals are often puzzled by the use made of the word "deal" by nearly all foreign publications, and some home ones. As generally used it means simply a piece of soft wood lumber; but the strict definition of the word, as understood by the English timber-merchant, is soft wood timber imported and sawn to the section of 3″ x 9″, or 4″ x 8″, or 4″ x 10″. Similarly, "planks" are 3″ x 12″ or 4″ x 12″, and "battens" 2 1-2″ x 7″ or 3″ x 7″, all irrespective of length, which varies considerably, and of the country or port they come from. — *Journal of Progress.*

DEMERARA GREENHEART.



FROM A GERMAN LATHE. — 16TH CENTURY (REVUE DES ARTS DECORATIFS.)

Greenheart as a wood is well known, but it has been unnoticed save by ship-builders and marine engineers, by whom, from possessing special merits, it is highly esteemed. Its merits primarily are its durability and its power of resisting the ravages of worms and other forms of marine life. Outside the influence of the ship-builder and the marine engineer it is little known, and as a wood has been treated with undeserved neglect. We are of opinion that it possesses merits outside the influence of these trades, and that such merits have only to be pointed out to bring the wood into prominent use.

Greenheart is the natural associate of teak-wood, as it is used side by side with that wood, both in shipbuilding and in marine engineering. It is one of the ten woods classed A 1 at Lloyd's. Greenheart, although a product of the forests of South America, only rates at about half the price of teak-wood, the one being purchasable at about 3 *s.* 6 *d.* per cubic foot, and the other at about 7 *s.* Why this difference should exist it is not easy to explain. In shipbuilding it may be that the weight of greenheart is against it, for its specific gravity is 1,149, against teak 800, and oak 828. Teak, although a most expensive wood, and one not possessed of pleasing grain or color, has made considerable progress outside the above trades. It is well known in the building of railway-carriages, for staircases and floors where a great amount of wear has to be contended with; but its compeer, greenheart, is unknown in these special departments of trade. In railway-carriages it may be that greenheart is discarded on account of its weight, which, it will be seen, is about one-third more than teak-wood and one-fourth more than oak; but for stairs, floors, and a hundred purposes in the constructive arts, we fail to see why it is not adopted in preference to any other wood. It has the qualities of being hard, tough, strong, and elastic, added to which it is very durable in point of wear, and practically indestructible with regard to fire. As a building timber its price, compared with its strength and durability, ought to place it in the foremost rank. It is imported in logs, from 24′ to 50′ long, and in squares ranging from 12″ to 24″, and logs are recorded as long as 70′, and 24″ square, so that no objection can be taken to it on the score of size. In color it is not unlike oak, except that it has a greenish tinge. Its face is lustrous, but except in figured logs it cannot be termed an ornamental wood. The figure, which is somewhat rare, partakes of that found in American birch, caused by the fibres in the outer wood, under certain conditions of growth, taking a waved or tortuous course. It has the specialty of being remarkably free from knots, and of being more free from ring and heart shakes than any other wood. The sap-wood is most difficult to tell, and although there are experts who assert that it forms one-fifth to one-third of its bulk, there are others who assert that it is a wood free from sap, or, if not free, that the alburnum, like that of the lignum-vitæ, is as durable as the duramen.

As a weight-carrying wood, we question, when its size and practicability are taken into account, if it has a rival. The breaking weight of a specimen 7′ long and 2″ x 2″ square is 1,332 pounds, against teak 877 pounds, and oak 900 pounds. Its crushing weight on a cube of 4″ x 4″, is $98\frac{037}{1000}$ tons, against teak $37\frac{5}{100}$ tons, and oak (green) $33\frac{041}{1000}$ tons.

A peculiarity in greenheart is that it is liable to shake or split at the ends; this is such a marked movement in planks cut from the logs that they are invariably bound with hoop-iron. Charles Waterton, the great naturalist who travelled in South America from 1812 to 1824, speaks most highly of the greenheart; and the Rev. J. G. Wood, who reissued Waterton's work in 1879, says that Waterton brought some greenheart wood to this country, to be made into furniture for Walton Hall, Yorkshire, and very excellent furniture it is said to have made. Mr. Wood thinks it possible that this furniture may still be at Walton Hall.

As a furniture wood, its color, during the present fashion for dull goods and sage greens, cannot fail to be acceptable. Its great strength admits of its being used in small volume, its small dimensions compensating for its great weight. From its compact nature it is

susceptible of elaborate ornamentation, more especially in the lathe. In hardness it compares somewhat with ebony and satinwood, and hence, when used in the veneer, would admit of being cut to a fine gauge. As to its ornamental character we know very little; but there are figured specimens, the use of which is now under the consideration of practical cabinet-makers.

The Rev. J. G. Wood informs us that there are three varieties of greenheart: the yellow, the black, and the "mainop;" it need scarcely be said that the yellow is the variety generally known in this country, and the one to which the above remarks refer.

We have of late heard a great deal on the subject of fire-proof or fire-resisting materials. Cased wood and concretes have received prominent notice, and the opinion is general that wrought and cast iron are questionable materials. Wood, we know, is an inflammable material, and on the average forms the bulk of the fuel that keeps up the flames in burning buildings; but there are woods of a highly inflammable character, and others which are slow or difficult to burn. The ordinary fir-wood, which forms the bulk of the timber in every building, is highly susceptible of fire, and when once ignited is difficult to extinguish; on the other hand, it is well known that oak as a timbering wood will not ignite or feed a fire in like degree to fir-wood. The secret of this lies in the fact that oak is a hard, compact wood, whilst fir is soft and resinous. It thus follows that all hard, dense, or compact woods are in large degree uninflammable. Compared with greenheart, oak is a soft, porous wood, one that fire would make inroad upon, whilst greenheart would stand uninjured. As a wood, we do not maintain that greenheart is fire-proof; but if wood is to assume fire-proof qualities in any degree, such qualities are only to be found in hard, dense and compact woods, at the head of which we may safely place greenheart.

For bearing purposes greenheart has no rival, and we maintain that beams of this wood possess high qualities in the direction of resistance to the inroad of fire; such beams, if cased with plaster or other fire-resisting material, would stand uninjured in any ordinary fire, and would be more reliable in their conduct than cast or wrought iron.

This question of introducing hard-wood into buildings as a fire-proof material is a new one, and one that calls for our most serious consideration. There is no doubt that it is more qualified to resist the inroad of fire than ordinary fir timber, or than that highly combustible wood that is now so generally used, "pitch-pine." This being the case, what is to prevent us from using such non-inflammable woods as greenheart for the internal wood-work of our buildings? Taken as a timber for bearing purposes, we have to face the fact that it is double the cost of fir-wood or pitch-pine. Against this drawback we have the fact that one-third of the scantling size may be reduced throughout in the case of greenheart, to balance the bearing qualities of the three woods. The breaking weight of a 7′ scantling, 2″ x 2″, placed 6′ between the bearings, is as follows: —

Fir-wood.	Pitch-pine.	Greenheart.
876 pounds.	970 pounds.	1,332 pounds.

This reduction of one-third in volume goes far to assimilate the cost of greenheart with firwood and pitch-pine, after which the difference is far outweighed by the advantage of introducing a less volume of wood into any given building, where it may in case of accident become food for fire, and in that less volume being of a hard or uninflammable character.

We are free to admit that the fire-resisting qualities of greenheart have not been tested in burning buildings, but we have the fact that fir-wood is soft and inflammable, and that hard-wood is in every way its opposite. This is well known so far as kindling is concerned, for if it be hard-wood, such as mahogany, a fire cannot be kindled with it, nor will it be readily kept alive by feeding with such wood. A block of such wood will invariably damp out a fire, where one of fir-wood or pitch-pine will prove a living coal. A friend of the writer, an old practical ship's carpenter, who has circumnavigated the globe, says of greenheart: "It is as hard and strong as iron, and so dense and compact that fire will scarcely touch it." This being the case, why not, we ask, bring it prominently forward as a building timber, and use it in place of the highly inflammable and cumbrous woods which are so undeservedly popular?

The test of inflammable and non-inflammable woods rests largely with their specific gravities, a light soft wood being more susceptible of fire than a heavy hard-wood, especially so if the soft wood is charged with oil and resin. To assist those interested in this subject, we give the specific gravities of the following woods, 1,000 being the equivalent of water — that is, those under 1,000 will float with more or less buoyancy, whilst those over 1,000 will sink below the surface:

Quebec yellow-pine.	Baltic fir.	Pitch-pine.	English oak.	Greenheart.
513	562	635	828	1,149

The above statistics are obtained from the Government dock-yards. We extract them from the valuable work by Laslett, "*Timber and Timber Trees.*" It may be said that the specific gravities vary greatly with different examples of soft woods, but that they are very uniform in the hard-woods.

The high specific gravity of greenheart is shown in the respective weights per cubic foot: Quebec yellow-pine, 32.08 pounds; Baltic fir, 35.09 pounds; pitch-pine, 39.37 pounds; English oak, 51.72 pounds; greenheart, 71.82 pounds.

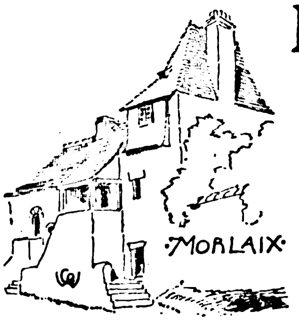
On all hands we see that greenheart is a wood of great strength, durability, and size, one highly endowed with fire-resisting qualities, one that necessitates a less volume of wood being introduced into a building for a given amount of work, one, considering the lightness of the scantlings required, that is low in price, and, lastly, one practically within reach of the builder, when the policy of using soft, inflammable and bulky woods is set aside. — *Timber Trades Journal.*

THE INCOHERENT ARTS.

Paris is laughing just now over a curious picture-show — the Exhibition of the Incoherent Arts, in the Galerie Vivienne. It is, says a correspondent of the *Manchester Guardian*, in some sort the revenge of the men who cannot find a place in the coherent arts. Once a year — at least this is the second year of it — a sympathetic member of that order invites all his fellows to send in their wildest inventions in satire of the great existing schools. It is peculiarly appropriate just now, while the solemn triennial show in the Champs Elysées is still open. In the one you see the schools on their serious side; in the other, you see them in caricature, and the caricature is by a long way the more amusing. The brush seems, after all, the best implement for satire on the brush. No doubt in time to come many of the contributors to this modest show, when seeking for admission to the Institute, will feel glad to buy up all the copies of a certain small yellow catalogue which recalls their participation in this practical joke. For the moment, however, they laugh without a thought of the morrow, and it is impossible not to laugh with them. Their fun is pretty equally distributed among all the schools. A distinguished impressionist on our side of the water comes in for a share of it in the painting of a *Nocturne in Two Voices*—a few dabs of red and a few dabs of white in a cloud of gloom. It is not only impressionist, but, say what you will, it is impressive in its suggestion of an infinite mystery of darkness, though it was certainly never meant to be that. This mark of the school — its taste for vast, misty effects — is shown again in the study of *Hyacinthe in London*. Hyacinthe, the actor, as every Parisian is aware, is famed for his abnormal development of nose; in the picture we see this organ, and this organ only, in the foreground of one of our densest fogs. The impressionists receive another hit in an absolutely empty frame labelled *A Painting of the Future*. The realists are even more severely treated. In *The Macaroni Harvest in Naples* we have a woman, with a bundle of sticks of real macaroni on her back, in a field covered with a growth of the same kind. The catalogue informs you that you are quite at liberty to taste and try. *An Egyptian Frigate Chasing Three Cholera Patients* belongs to the same school of art. The three cholera patients are three red herrings fastened to the canvas, and realistic in treatment beyond all doubt. The *Paris by Night and Paris by Day* cuts with a double edge at the Realists on one side, and at the Prefect of the Seine on the other, who has lately caused an all but absolute block of traffic by simultaneously repaving half the city with wood. This is not a picture, indeed, but rather a statuary group, made up of a wheelbarrow, a pickaxe, a shovel and a lantern, in exact resemblance of the curious trophies of labor that are now to be seen everywhere in the streets. *The Genius of Naturalism*, dedicated to M. Emile Zola, is a figure of a winged boy with the head of a pig; and the *Portrait of M. de la Pommeroye*, the critic and lecturer, is realism carried to its furthest limit. Only the face is painted; the hair is real hair, the books in the foreground and the glass for water are real glass and real books, the eyeglass and the long drooping moustache are as real as all the rest. *The One-Year Volunteer* is another portrait study, treated with all that originality of invention in this style which the younger painters have brought so much in vogue. It is merely a hand and arm, the hand gloved with that huge coarse mitten which the French linesman wears on public occasions, and which is his most distinctive mark. The theory, presumably, is that you are to represent your sitter by what is most characteristic of him, and the characteristic of the little French soldier is his big-gloved hand; all the rest of his body is mere detail. Another portrait is more fantastic still. This is the *Venus de Mille Os*, and it bears a marked resemblance to Madame Sarah Bernhardt. The face is the face of Sarah, but the body is made up of innumerable bones, a rather retrospective satire on her thinness, for she has long since grown as shapely as most of her rivals. In the military series we have several square yards of canvas, which are at the same time only so many square yards of battle smoke, with here and there a *képi*, and here and there a sword. They represent *Jena*, *Solferino*, *Magenta*, *Wagram*, *Austerlitz;* and

you are to take your choice among them for any particular battle you want. There has been nothing more telling since that painting shown in a piece at the Variétés, which, if you held it up one way, was the desert under a blue sky, and if you turned it upside down was the Mediterranean under glowing heavens. The *Clarion sounds the Charge* is at once military and realistic. The warrior rushing at us right out of the picture is half painted and half real properties; his plume and his sword stand out in relief half a foot high. In the *Incoherent National Flag*, hung as a decoration on the staircase, the artist has finely typified the confusion of parties and factions as it must exist in the mind of a plain dealer. The ground of the flag is the red of the barricades, but this is dotted with the lilies of France; and the flagstaff is surmounted by the imperial eagle. Make what you can of it; but then make what you can out of the politics of the day! *Genre* does not escape. The French have always had a certain contempt for those pictures representing domestic or every-day incident that find so much favor on our side. Here we have a study of a street bootblack and his customer. The customer is a mendicant friar without shoes, and the astonished artist of the brush is asking him if he wishes to have the great toe blacked as well as the rest. The catalogue is a continuation of the jest; every artist, as in the dignified official volume of the *Salon*, is required to give his name and birthplace, and the name of his master. All sorts of names are given, partly no doubt from motives of prudence; and, still further to baffle inquiry, the birthplace is equally vague or misleading. One artist declares that he was "born at Bougival or elsewhere;" another, that he was born at Cape Horn; a third, that he has really forgotten his baptismal name; a fourth writes himself down a "pupil of Rembrandt;" another is "self-taught but vaccinated;" and one dates from the madhouse at Bicêtre. This gentleman contributes a row of figures in gingerbread, which may be said to be the masterpiece of the department of sculpture. Grotesque as it is, the show may not be without a wholesome effect upon certain eccentricities of the art to-day.

HOUSE-BUILDING SUPERSTITIONS IN THE EAST.



IN England house-building is a matter on which, in spite of "jerry" builders, one can look with comparative equanimity. In Indo-China it is a very different affair. Everything that is a source of trouble in the West disappears in those comfortable latitudes. A site can be found practically anywhere. The jungle furnishes for the trouble of cutting it, as much material as may be required. Comparatively so little skill is wanted to start as an architect that every man can be his own house-builder, and if he is tolerably diligent and not too ambitious, might finish his house in a few days; but as a set-off to all these advantages, it is a very difficult matter to raise up a house which is not rendered dangerous or ineligible by the nature of the soil, the idiosyncrasies of the surrounding spirits, or the revolutionary character of the timber used. Building houses is therefore a very critical operation, and not to be undertaken without very considerable Sabaistic lore, and an intimate acquaintance with all the animistic peculiarities of the neighborhood. For the instruction, therefore, of those who are forced by necessity, or are foolhardy enough to believe that they can build themselves houses without coming to any particular harm, there are elaborate text-books, both in Burmese and Siamese. The Burman Dehtton is a bulky treatise, containing a farrago of omens and signs with regard to all possible events and circumstances, and not merely to the process of building. The Siamese Tamra, or Manual of House-Building, is considerably more systematic, and, in addition, possesses the advantage that it sticks to the subject of which it professes to treat. The theories in both works are based on and elaborated from the Shastras which record the customs of the Brahmins. Notwithstanding their Buddhism, which prohibits all such beliefs, the Indo-Chinese have a very strong regard for the Brahminical observances. The house-building code is therefore a very popular institution. It persuades a man that he is pious when he has an internal conviction that he ought to be damned.

The first thing the would-be house-builder has to do is to find out the situation of the great dragon that encircles the earth with his body, like the Midgard serpent of Northern mythology. This must be ascertained before operations are begun at all, for it will have a great influence, not only on the time of beginning the building, but on the way in which the foundations must be dug, and the method of hoisting the posts into position. This the Burmese have recorded for them in a rhyme which every schoolboy can repeat. The Siamese are not less alive to the necessity of accurate information on the subject, and it is fully set out in the Tamra. The reason of this is that when you come to dig the hole for the main post of the house you must heap up the earth on the side toward the Nagah's belly. Terrible consequences follow if you do not observe this preliminary precaution. When you have settled generally how you ought to dig, there are a number of special rules to be observed in the digging itself. It will never do to go blindly ahead, for all the world as if you were a navvy on piece-work. In the first place it is well to dig at large all over the space your house is intended to cover; in fact, if you have any regard for yourself, you certainly will. There are divers reasons for this. If you find costly articles, silver or gold, or the images of men and deities, it is a most happy sign, and will go far to counteract all but willful remissness in other matters. On the other hand, when bones or ashes, or the figures of wild animals are found, the deductions are most unpropitious, and if you persist in going on, the house will have neither luck nor peace. If the remains of previous house-posts are found still lying buried in the ground, they must be carefully dug out and carried away, for if this were not done, and a new building were to be run up over the old remains, sickness and quarrellings would be the certain result.

At any rate, whether you get the advice of an expert or not, it is imperative that you should carefully turn over all the ground where the new building is to be. Having done this, it is a matter of reasonable precaution to make offerings to the earth-spirit. Acquaintance with this Phra Phum and his belongings is no light matter, and is likely to be as good as an annuity to the man who has mastered the details. As he is an earthy spirit he is especially liable to mortal failings, and notably possesses a very short temper, which will brook no deficiency in reverence. Negotiations with this deity are therefore rather ticklish work, but it is perilous to leave them undone. The site being settled, and things made right with the guardian spirit of the earth, the next thing to be done is to dig holes for the reception of the posts. It is necessary to begin with that for the chief post, and the hole for this must not be dug square, but in the form of a triangle. This may imply more work, but that cannot be helped. When the hole for the main post is finished, go on with the others, but be sure to do it in regular order, working round in circles, from right to left, so as to follow the line of the dragon's body from head to tail. When it comes to the hoisting of the posts into position, the face must throughout be turned toward the back of the Nagah, a little inclining toward the tail, and the post must be heaved up toward this point of the compass. It is also necessary to be very careful in the selection of the timber for the house. Trees especially to be avoided are those which have no flowers, those which have no leaves, trees which grow on ant-hills, trees with birds' nests on them, and those from which the bark has been torn off from whatever cause. Unhappily these distinctions are not obvious in timber which you have not cut yourself, and rascally Chinese carpenters will not hesitate to palm off upon the unwary wood from a tree of which scores of egrets — the Byeing, or sacred paddy-bird of the Talaings — have nested. After you have got the posts up, the surface of the ground must be smoothed down, and then the posts are decorated with little bags of shells, coins, husked rice, and the like. These must be hung up by the hands of a maiden, and not by any rude male. The heads of the posts are also covered over with cloth, for the safe keeping of the guardian spirit of the house.

It would be neither seemly nor safe to leave him exposed to the elements. The final ramming in of the posts is done at an hour fixed by the astrologers, the culminating point of some happy constellation. There is much shouting and feasting on the occasion.

With the foundation of his house settled satisfactorily, the sensibilities of the great world-dragon and the guardian spirit of the earth soothed and conciliated, and the house-posts raised and decorated with proper profusion, the house-builder may consider himself past all his troubles. — *Saturday Review.*

NOTES AND CLIPPINGS.

Cypress.— The cypress used in New England is principally of the yellow variety, and is obtained in Alabama and along the Gulf Coast. It is used in making cisterns, tanks and vats for breweries and mills, and seems to be growing in favor for dyeing and chemical vats, as the dye does not affect it so much as other woods. It is being used largely for shingles, gutters, sills, fancy and common fencing, doors and door jambs, and for sashes and blinds. It is also used for outside and inside finish, and polishes up handsomely. As a foundation for buildings on filled-in land where the wood becomes wet and then dry it is valuable, as it will not rot as other woods do. It is being used considerably at present by builders of row-boats and yachts. The lumber generally runs large and clear, is cheap and very durable, and as its merits become better known will be a very popular wood in the North. — *The Lumber World.*

The Lately Discovered Roman Remains at Paris.— The remains of the Roman arena which were brought to light in Paris some time ago are in a much better state of preservation than was at first imagined; and now that the passage, one hundred feet long by twenty feet wide, which leads down from the main entrance to the arena itself, has been cleared of the débris, it is easy to form an idea of what the ruins will look like when the other obstructions have been removed. "Descending into the amphitheatre by this passage," says the *St. James's Gazette*, "the visitor will have to his left the stone seats rising one above the other, in front of him the semicircle formed by the wall enclosing the arena, and to his right the outline of the stage, which is still very well preserved. Only one-half of the arena has been excavated; but the other half, which belongs to the Paris Omnibus Company, will probably be purchased by the municipality; and in the meanwhile the various fragments of columns, sculpture, etc., which are now in the Carnavalet Museum, and which are known to have been removed from the arena, will be taken back. Although this is the oldest building in Paris, dating as it does from the time of Hadrian, very few relics of great antiquity have been discovered during the progress of the excavations; but among the bones which have been dug up are some which apparently belonged to the wild animals killed in the amphitheatre."

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[*Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.*]

BUILDING PATENTS.

[*Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.*]

288,611. Sash-Holder. — Henry H. Asimont, Duluth, Minn.

288,612. Self Opening and Closing Hatch-Door of Elevator-Shafts. — Samuel W. Bickley, Mexico, Mo.

288,613. Mitre and Framing-Square. — Jas. H. Bolles, Dallas, Tex.

288,621. Fire and Water Proof Paint. — Wm. S. Chandler, Jackson, Mich.

288,624. Spirit-Level and Plumb. — Leonard L. Davis, Springfield, Mass.

288,633. Latch. — Charles Inward, Osage, Iowa.

288,649. Brick-Machine. — Gaylord Martin, Milwaukee, Wis.

288,651. Trestle. — Michael Miller, Glenwood, Iowa.

288,655. Water-Closet. — James Muirhead, Olneyville, R. I.

288,676. Manufacture of Auger-Bits and other Boring-Tools. — George F. Stearns, Chester, Conn.

288,694. Composition for Walls. — John R. Davis, Clarence M. Wyrick, and Samuel Parker, Moundsville, W. Va.

288,708. Heater. — Robert Johnson and John F. Buerkel, Boston, Mass.

288,713. Wrench. — John Lee, Sterling, O.

288,722. Vise. — Edward L. Morris, Boston, Mass.

288,731. Fastener for the Meeting-Rails of Sashes. — Frank D. Paradise, Memphis, Tenn.

288,736. Micrometer-Calipers. — Leopold L. Remacle, New York, N. Y.

288,748. Bit-Brace. — John Watson, Buffalo, N. Y.

288,751. Window-Sash. — Francis R. Wolfinger, Chicago, Ill.

288,756. Fire-Escape Ladder. — Frank H. Anthony, Brooklyn, N. Y.

288,758. — Water-Waste Preventer. — William Bartholomew, Doulton's Sanitary Engineering Works, Albert Embankment, County of Surrey, England.

288,769. Faucet. — Leopold Braudeis, Brooklyn, N. Y.

288,770-771. Calipers. — Reuben H. Brown, New Haven, Conn.

288,781. Faucet. — Bernard Duerstock, Cincinnati, O.

288,793. Eaves-Trough Hanger. — Daniel Gottschalk, Dunkirk, N. Y.

288,798. Screw. — Hayward A. Harvey, Orange, N. J.

288,806. Safety-Appliance for Elevators. — John Hodges, Westfield, N. J.

288,817. Try-Square. — Robert Hodges, Philadelphia, Pa.

288,834. Shutter-Hinge. — Lyman W. Merriam, Winchendon, Mass.

288,856. Heating-Furnace. — Justus M. Preston and John L. Bacon, Joliet, Ill.

288,865. Faucet. — John R. Rueckert and Robert A. Hall, Baltimore, Md.

288,866. Joiner's Plane. — Solon R. Rust and Arthur E. Rust, Pine Meadow, Conn.

288,876. Manufacture of Tiles, Bricks, etc. — Isaac B. Shaw, Tunstall, County of Stafford, England.

288,882. Ratchet-Drill. — Albert Soderstrom, Stockholm, Sweden.

288,884. Elevator-Hatchway Guard. — Nathan K. Sprague, Milford, Mass.

288,887. Speaking-Tube. — Henry C. Strong, Chicago, Ill.

288,894. Brick and Tile Machine. — William W. Wallace, Frankfort, Ind.

288,902. Fire-Escape. — William Wightman, Denver, Col.

288,918. Door-Hanger. — William B. Botsford, Millport, N. Y.

288,920. Door-Securer. — Frank Burrows, Washington, D. C.

288,921. Window-Screen. — Volney R. Chamberlin, Cambridge, Mass.

288,923. Wood-Screw. — Isaac Cole, Newark, N. J.

288,927. Wrench. — Henry Crowther, Providence, R. I.

288,935. Fire-proof Compound and Sheet. — Nathaniel C. Fowler, Boston, Mass.

288,943. Window-Screen. — Edwin Hunter, Allentown, Pa.

288,961. Calipers. — Oliver D. Warfield, Chicopee Falls, Mass.

SUMMARY OF THE WEEK.

Baltimore.

Dwellings. — Chas. E. Cassell, architect, has prepared drawings for Mrs. Dulin for 2 three-st'y marble front buildings, 25′ x 80′ each, on the s s Monument St., between Cathedral and Pearl Sts.; cost, $30,000.

Building Permits. — Since our last report twenty-five permits have been granted, the more important of which are the following: —

Wm. H. Oler & Co., two-st'y brick shop, 30′ x 60′, w s Eden St., between Lancaster and Aliceanna Sts.

Chas. H. Callis, 13 two-st'y brick buildings, w s Chester St., commencing n w cor. McElderry St.

J. P. Brandau, 11 two-st'y brick buildings, commencing s w cor. Charles and Heath Sts., fronting on Charles St.

John Daugherty, two-st'y brick building, w s Carrollton Ave., between Pratt and Lombard Sts.

E. W. Gorman, 5 two-st'y brick buildings, s s Hampstead St., between Patterson Park Ave. and Bradford Alley.

Robert Rennert, five-st'y brick building, s s Fayette St., between Charles and St. Paul Sts.

Mrs. Fannie Lurman, two-st'y brick stable, e s Foster Alley, between Mosher and McMechen Sts.

John L. Brooks, two-st'y brick building, 20′ x 30′, in rear of No. 357, s s Pratt St., between Greene and Emory Sts.

John Scherer & Son, two-st'y brick building, s s Raborg St., between Poppleton and Fremont Sts.

Chas. E. Willis, 4 two-st'y brick buildings, e s Monroe St., between Coale and Eager Sts.; and 7 two-st'y brick buildings, n s Eagle St., commencing n w cor. Fulton Ave.

W. G. Divan, 2 two-st'y brick buildings, e s Gilmor St., s of Baker St.

John Schem, two-st'y brick stable, in rear, s e cor. Hanover and Heath Sts.

Susan C. Poultney, 5 three-st'y brick buildings, n s Pratt St., between Payson St. and Goldsmith Alley; and 5 two-st'y brick buildings, s s Lemmon Alley, in rear of above.

Pikesville Dairy Co., two-st'y brick stable, 31′ x 40′, w s Wilmer Alley, n of Mosher St.

There will be no change in the Labor Market Report for the month of December.

Boston.

Building Permits. — *Brick.* — *Commonwealth Ave., Nos.* 340-348, Ward 11, for Geo. Wheatland, 5 dwells., 22′ x 58′, three-st'y mansard; Vinal & Dodge, builders.

Newbury St., near Hereford St., Ward 11, for Henry Whitwell, dwell. and stable, 22′ 6″ x 78′, two-st'y flat; Joseph M. Keening, builder.

Wood. — *Prentiss St.*, Ward 21, for Babette Ehrlich, stable, 27′ x 35′, two-st'y pitch.

Bower St., No. 74, Ward 21, for Albert R. Wentworth, stable, 22′ x 28′, one-st'y pitch; Mr. Craber, builder.

Wayne St., near Blue Hill Ave., Ward 21, for Augustus Parker, dwell., 28′ x 38′, two-st'y pitch; Wood & Wetherbee, builders.

Forrest St., rear, near Adams St., Ward 24, for John L. Gurney, greenhouse, 13′ x 85′ 6″, one-st'y pitch; Wm. H. Gordon, builder.

Capen St., near Dyer St., Ward 24, for Charles A. Ufford, dwell., 19′ x 26′, two-st'y pitch; Mr. McKenzie, builder.

Dorchester Ave., junction Adams St., Ward 24, for Henry Godfrey, dwell. and stores, 30′ x 40′, two-st'y flat.

Leslie Pl., near Centre St., Ward 23, for Joseph Page, dwell., 17′ x 18′ and 24′ x 30′, two-st'y pitch; Melvin V. Ayers, builder.

Harvard Ave., near Fairington St., Ward 25, for A. S. Richardson, stable, 33′ x 40′, one-st'y pitch; C. W. Bowers, builder.

Parker St., Nos. 721 *and* 723, Ward 22, for Jacob Goldsmith, 2 dwells., 20′ 6″ x 44′, three-st'y flat; Robert D. Ward & Co., builders.

Brooklyn.

Building Permits. — *Bergen St.*, n s, 345′ e Grand Ave., 2 two-and-one-half-st'y brick dwells., felt and gravel roofs; cost; each, $3,000; owner, Francis O. Irish, Bennett Building, New York City; architect, A. Hill; builders, S. Nash and J. Brown.

Willoughby Ave., s s, 120′ w Steuben St., 2 four-st'y brownstone front tenements, felt and gravel roofs; cost, each, $6,000; owner, Geo. W. Brown, 718 Fulton St.; builder, L. E. Brown.

Waverley Ave., w s, 100′ s Myrtle Ave., two-st'y brick stable, tin roof; cost, $2,500; owner, P. M. Dingee, Clinton Ave., cor. Myrtle Ave.; architect, Chas. Werner; builders, Burns & McCann and Jno. Lee.

Greene Ave., n s, 125′ e Stuyvesant Ave., 3 two-st'y brownstone front dwells., tin roofs; cost, each, $4,500; owner, A. S. Walsh, New York City; builder, A. Miller.

Berkeley Pl., s s, 136′ w Eighth Ave., 4 three-st'y brownstone front dwells., tin roofs; cost, each, $13,000; owners and architects, J. Doherty & Son, 280 Flatbush Ave.

Pulaski St., n s, 150′ e Sumner Ave., 18 two-st'y brownstone front dwells., tin roofs; cost, each, $4,500; owner, Thos. J. Moore, 72 Sumner Ave.; architect and builder, Jno. Erickson.

Hart St., n s, 149′ 8″ e Sumner Ave., two-st'y brownstone front dwell., tin roof; cost, $4,500; owner, Thos. J. Moore, 72 Sumner Ave.; architect and builder, Jno. Erickson.

Chicago.

Society-Building. — An attempt is making to raise money for building a temple for the Knights of Pythias.

Building Permits. — John Cassidy, 3 three-st'y stores and dwells., 2713 to 2717 Archer Ave.; cost, $12,000; architect, Wm. L. Carroll.

Mrs. Oatman, three-st'y dwell., Woodland Park St.; cost, $8,000; architects, Wheelock & Clay; builder, U. P. Smith.

Baird & Douglas, 4 two-st'y dwells., 790, 792, 800, 802 Walnut St.; cost, $10,000; architect, J. Austin; builder, A. Carlson.

O. D. Wetherall, two-st'y factory, 72 and 74 Ewing St.; cost, $5,000; architect, W. Drake; builder, Geo. Lehman & Co.

West Side Brewing Co., two-st'y barn, 191 Rumsey St.; cost, $4,000.

S. M. Bushnell, 2 three-st'y dwells., 175 and 177 Warren Ave.; cost, $16,000; architects, Edbrook & Burnham; builder, M. Mortimer.

Geo. W. Tilton, two-st'y dwell., 377 Warren Ave.; cost, $15,000; architects, Edbrook & Burnham; builder, M. Mortimer.

Frank Slatkin, three-st'y flats, 1 Henry St.; cost, $4,000.

Dr. E. W. Lee, 4 three-st'y stores and dwells., Van Buren St., cor. Laflin St.; cost, $30,000; architect, James R. Willett; builder, J. M. Dunphy.

G. W. Williams, 2 two-st'y dwells., 1102 and 1104 West Harrison St.; cost, $6,000; architect, A. Williams.

W. H. Thomas & Son, two-st'y flats, 1427 and 1429 Jackson St., cost, $6,000.

Mrs. Lena Clemens, two-st'y dwell., 3425 Dearborn St.; cost, $4,000.

H. W. Bliss, two-st'y dwell., 2963 Indiana Ave.; cost, $6,000; architect, B. Penner; builder, B. Davis.

Ida L. Place, three-st'y store and flats, 484 Van Buren St.; cost, $6,000; architect, C. A. Placey.

Fred. Volance, two-st'y dwell., 21 Zion Place; cost, $3,000.

Godfrey Snydacker, two-st'y barn, 2522 Michigan Ave.; cost, $3,000.

R. Garnett, two-st'y dwell., 760 Adams St.; cost, $3,700.

Bohemian Free Thinking School, three-st'y addition, 400 Eighteenth St.; cost, $17,000.

Theo. Ludis, three-st'y store and dwell., 2449 Wentworth Ave.; cost, $6,000; architect, J. F. Doerr; builder, A. Mueller.

L. C. Stebbins, two-st'y stores and dwells., 815 to 821 Clybourne Ave.; cost, $10,000; architect, H. M. Hansen; builder, L. Gottschalk.

A. Dreyer, 7 two-st'y dwells., 830 to 844½ Jackson St.; cost, $10,000.

Ela & Rogers, 2 three-st'y dwells., 207 and 209 Park Ave.; cost, $12,000; architect, Julius Huber; builders, Krieg & Demuth.

New York.

Two holidays in the week have pretty thoroughly broken up business, and little new work is reported.

Hotel. — An eight-st'y hotel, to cover a lot 100′ x 100′, is to be built on the n e cor. of Madison Ave. and Fifty-eighth St., at a cost of about $225,000, from designs of Messrs. D. & J. Jardine; Mr. V. K. Stevenson, owner.

Houses. — Six first-class houses are to be built on the s e cor. of Seventy-ninth St. and Park Ave., by Mr. Jas. A. Frame.

Building Permits. — *Second Ave.*, n e cor. One Hundred and Fifth St., four-st'y brick tenement and store, tin roof; cost, $16,800; owner, Jacob L. Maschke, 210 Rivington St.; architect, J. C. Burne.

Second Ave., e s, 25′ n One Hundred and Fifth St., 2 four-st'y brick tenements, tin roofs; cost, each, $15,000; owner, architect, etc., same as last.

Second Ave., e s, 75′ n One Hundred and Fifth St., four-st'y brick tenement and store, tin roof; cost, $16,000; owner, architect, etc., same as last.

One Hundred and Fifth St., n s, 75′ e Second Ave., five-st'y brick tenement, tin roof, cost, $15,000; owner, architect, etc., same as last.

Third Ave., n e cor. Eighty-ninth St., four-st'y brick tenement and store, tin roof; cost, $21,000; owner, John McCarthy, 1480 First Ave.; architect, Eugene Parker.

Tenth Ave., w s, 75′ n Seventy-fourth St., five-st'y brownstone front flat, tin roof; cost, $23,000; owner, Stephen H. Mapes, 333 West Fiftieth St.; architects, Thom & Wilson.

Fifty-eighth St., n s, 100′ w Eleventh Ave., two-st'y brick boiler and coal-house, gravel roof; lessee, Jas. Eastman, No. 1 East Seventy-second St.; architect, J. E. Terhune.

Fifty-eighth St., n s, 257′ w Eleventh Ave., two-st'y brick engine-room and brine-tanks, gravel roof; lessee and architect, same as last.

One Hundred and Twenty-fourth St., s s, 137′ e Second Ave., 2 four-st'y brick flats, tin roofs; cost, each, $16,000; owner and builder, Thos. J. O'Kane, 144 Alexander Ave.: architect, J. H. Valentine.

Second Ave., n e cor. Sixty-fourth St., five-st'y brick tenement and store, tin roof; cost, $19,000; owner, Thos. Hall, 219 East Seventy-fifth St.; architect; J. H. Valentine; builder, J. O. Hall.

One Hundred and Twenty second St., s e cor. First Ave., one-st'y brick store, tin roof; cost, $2,500; owner, Cornelia Austin, 25 Bond St.; builder, J. C. Henry.

Southern Boulevard, s s, 190′ e Third Ave., one and part two-st'y brick store, gravel or tin roof; cost, $2,500; lessee, Thos. A. Mitchell, 670 East One Hundred and Thirty-fifth St.; architect, John Rogers.

Fourth Ave., w s, 25′ s Eighty-third St., five-st'y brownstone front flat, tin roof; cost, $15,000; owner, Mary A. Foley, 1443 Fourth Ave.; architect, D. J. MacRae.

Fourth Ave., w s, 50′ s Eighty-third St., five-st'y brownstone front flat, tin roof; cost, $12,000; owner, architect, etc., same as last.

Alterations. — *Fifty-fifth St., Nos.* 404 *and* 406, internal alterations; cost, $4,000; owner, H. Elias, 158 East Seventy-first St.; architects, A. Pfund & Son.

East Fifty-fifth St., No. 421, raise building nine feet; cost, $5,000; owner, Peter Dolger, 403 East Fifty-fifth St.; architect, Chas Stoll.

Philadelphia.

Building Permits. — *Frankford Ave.*, n of Green St., two-st'y addition to hall, 26′ x 34′; Joe. P. Yerkes, contractor.

Wallace St., No. 913, three-st'y dwell., 16′ x 40′; Israel Sopp, owner.

Mill St., n e cor. Cumberland St., Germantown, two st'y addition to factory, 48′ x 60′; E. C. Sheppard, contractor.

Poplar St., w of Twenty-seventh St., two-st'y dwell., 18′ x 38′; Rudolph Yendel, contractor.

Orthodox St., between Tacony Road and Pennsylvania Railroad, one-st'y chapel, 26′ x 56′; R. H. Foulkrod, contractor.

Ducal St., s e cor. Adams St., 8 three st'y dwells., 16′ x 29′; Wm. H. Bruner, contractor.

Third St., n w cor. Vine St., two-st'y addition to bank-building, 17′ x 60′; A. H. Rorke, contractor.

Leithgow St., No. 942, three-st'y dwell., 16′ x 25′; Jno. Honderer, contractor.

Eighth St., s of Huntingdon St., 3 two-st'y dwells., 14′ x 50′; Jno. Loughran, contractor.

York St., n w cor. Orkney St., two-st'y marble-shop, 20′ x 38′; Eldridge & Stewart, contractors.

South Second St., No. 210, three-st'y store, 18′ x 80′; Geo. Watson, contractor.

Poplar St., w of Twenty-seventh St., two-st'y dwell., 18′ x 38′; Rudolph Yendel.

Wynona Ave., between Morris St. and Township Line, three-st'y dwell., 16′ x 32′; J. T. Eldridge, contractor.

Alterations. — Messrs. Wm. Ayers & Sons propose making extensive improvements to stores Nos. 311 and 313 Arch St., from plans by Hazlehurst & Huckel, architects.

For the Estate of Henry Korn, a five-st'y addition to store-building, 28 North Third St.; Hazlehurst & Huckel, architects.

Springfield, Ill.

Church. — The Society of the First M. E. Church, has purchased ground on South Fifth St., and will in the spring commence the erection of an edifice, to cost about $30,000. The plans have not yet been adopted.

Hotel. — Reisch Bros. Hotel, cor. Third and Jefferson Sts., 60′ x 80′, three-st'y high, pressed-brick with stone trimmings; cost, $20,000; Geo. H. Helmle, architect; Charles Diehr, builder.

Monument. — A wealthy St. Louis gentleman has given $10,000 for building a monument in memory of Menard, the first lieutenant-governor of Illinois. It is to be erected in the State-House yard; Joseph Baum is engaged upon the model.

School-Houses. — Stuart school-house, on South Sixth St., two-st'y brick school-house, 4 rooms, cost, $8,000; Geo. H. Helmle, architect; F. T. Welber, builder.

McClearnand school-house, on North Sixth St., two st'y brick school-house, 4 rooms; cost, $8,000; Geo. Helmle, architect; F. T. Welber, architect.

State-House. — The State of Illinois will expend $25,000 for a flag-stone pavement around the new State-House. The appropriation for the same was made by the last general assembly.

Stores. — Three-st'y stone front store-building for Milton Hay, on South Fifth St.; cost, $9,000; C. W. Shinn, architect; Jno. T. Rhodes, builder.

Three-st'y store-building for L. H. Coleman, on East Washington St.; cost about $7,500; C. W. Shinn, architect.

Houses. — Two-st'y frame dwelling-house for F. H. Jones; cost, $6,500; A. Lyon, architect, Chicago; E. F. Gehlman, builder.

Remodeling dwell. for Dr. B. M. Griffith; cost, $3,-500; Geo. A. Helmle, architect; Buck & McKee, builders.

Two-st'y dwelling-house for G. A. Van Duyan; cost about $12,000; C. W. Shinn, architect.

Two-st'y frame residence for Hon. C. E. Hay, on South Twenty second St.; cost, $8,500; George H. Helmle, architect; John Beam, builder.

Frame dwell. for Mr. Bennett, on South Fourth St.; cost, $3,000; C. W. Shinn, architect.

Two-st'y Queen Anne residence for John Capps, on South Fifth St.; cost about $4,000; George H. Helmle, architect.

Residence for Frank Myers, on South Seventh St., 8 rooms; cost, $3,8·0; Geo. H. Helmle, architect.

Residence for Geo. Kern, on South Eighth St., 8 rooms; cost, $3,500; Geo. H. Helmle, architect; N. Ritter, builder.

Dwelling-house for A. J. Smith, on South Douglas Ave., 8 rooms; cost, $3,000; Geo. H. Helmle, architect.

Alterations. — Remodeling residence for Charles Smorombl; cost, $2,000; Geo. H. Helmle, architect; Wm. Mayhew, builder.

Addition to H. W. Rokker's, book bindery on South Fifth St.; cost, $7,500; Geo. H. Helmle, architect; Henry Betinghouse, builder.

St. Louis.

Ice-House. — The Lafayette Brewery will at once begin the erection of a $10,000 ice-house.

Building Permits. — Seventy-two permits have been issued since our last report, sixteen of which are for unimportant frame houses. Of the rest those worth $2,500 and over are as follows :—

James Cummiskey, 4 two-st'y brick dwells.; cost, $4,·00 each, T. B. Annan, architect; T. Roach, contractor.

W. C. Popp, two-st'y brick dwell.; cost, $2,700; W. C. Popp, contractor.

C. Harrig, 2 two-st'y brick dwells.; cost, $5,000; A. Beinke, architect; Haesseler & Lewis, contractors.

A. J. Cramer & Co., two-st'y brick dwell.; cost, $3,000; Cramer & Co., contractors.

E. B. Mathews, two-st'y brick dwell.; cost, $2,500; J. H. Maurice, architect; Wm. Daman, contractor.

Mrs. Kate Bonsack, 3 adjacent two-st'y brick dwells.; cost, $7,500; F. C. Bonsack, contractor.

St. Louis Exposition and Music Hall Association, three-st'y brick and stone hall; cost, $400,000; J. B. Legg, architect; J. W. Givens, superintendent.

H. W. Kirchner, two-st'y brick dwell.; cost, $4,000, H. W. Kirchner, contractor.

Christ Pahl, one-st'y brick dwell.; cost, $2,500; Henry Debus, contractor.

St. Louis Mutual House Building Co., No. 3, 3 adjacent two-st'y brick dwells.; cost, $9,500; E. Mortimer, architect; Dan Evan & Brother, contractors.

Emile Karst, 2 adjacent two-st'y brick dwells.; cost, $5,666; J. B. Legg, architect; J. Stimple, contractor.

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P. W. Hassett, three-st'y brick dwell.; cost, $4,800; W. G. Gains, architect; P. W. Hassett, contractor.

T. M. Gilmore, two-st'y brick dwell.; cost, $3,000; Mortimer, architect; J. H. Randal, contractor.

Toledo.

Houses. — Double frame dwell., two-st'y, cor. Thirteenth and Monroe Sts., for Mr. W. H. Scott; cost, about $6,000; Jas. Hales, builder.

Stores. — Four-st'y brick store-building, Superior St., for Messrs. Hiett & Hartupee, 76′ x 116′; cost about $28,000; N. B. Bacon, architect; John Murphy, contractor for the stone masonry. Contract for superstructure not yet awarded.

Five-st'y brick and stone building for Toledo Blade, cor. Jefferson and Superior Sts.; D. R. Locke, ("Petroleum V. Nasby"), owner; size 40′ x 91′; N. B. Bacon, architect; cost of building about $35,000. The contractors for stone masonry, Henahan Bros.; contractor for iron-work, Herbert Baker. The contract for superstructure not yet awarded.

Washington.

Building Permits. — The following permits for new houses worth $3,000 or over have been issued since our last report.

K St., bet. Twenty-first and Twenty-second Sts., n w, 4 three-st'y brick dwells. for R. A. Buechler; cost, $14,000; B. B. Bradford, architect; Jno. H. Lewis, builder.

Thirty-first St., cor. Q St., n w, two-st'y brick dwell., for Geo. T. Dunlop; cost, $25,000; C. H. Reed, Jr., architect; W. C. Morrison, builder.

Iowa Circle, three-st'y brick dwell., for Jas. Robbins; cost, $10,000.

Sixteenth St., near Q St., n w, three-st'y brick dwell., for T. D. Wilson, U. S. N.; cost, $15,000; E. P. Friederick. architect.

General Notes.

Brunswick, Me. — The Dennison Manufacturing Co., is building a new store-house.

Concord, N. C. — The new factory of the Yadkin Falls Manufacturing Co., will be 52′ x 100′, two-st'y.

Crawfordsville, Ind. — Opera-house, 86′ x 165′, for Crawfordsville Building Association; Reid Bros., architects, Evansville, Ind.

Englewood, Ill. — S. E. Gross & Co. are about to build 14 houses for Dr. A. Brooks on Dickey St.

C. C. Landt & Co. are building by contract more new houses, and there is more building here than for years at this time of the season.

Georgetown, D. C. — Bids are being received in the office of the building inspector for the erection of the extension of the Industrial Reform School, for which an appropriation of $5,000 was made at the last session of Congress.

Germantown, Pa. — The Reading Railroad Company has decided to build a new station at Duy's Lane, at a cost of $17,000.

Kansas City, Mo. — Five three-st'y brick houses for C. W. Whitehead; cost, $21,000.

Madison Bridge, Me. — Possibly a woollen mill, 54′ x 152′, with a wing 40′ x 145′ will be built next season. The Madison Woollen Company also contemplates enlarging its mill.

Marysville, N. B. — Work on the large Gibson cotton factory is progressing rapidly.

Oldtown, Me. — Herbert Gray is erecting a new building, 30′ x 50′.

Tobyhanna, Pa. — A silk mill is building for the Standard Silk Company.

(*Continued on page 3, Trade Supplement.*)

COMPETITIONS.

COLOSSAL STATUE OF SIR W. WALLACE.

[At Aberdeen, Scotland.]

10 Bridge St., Aberdeen, October 15, 1883.

The testamentary trustees of the late Mr. John Steill, of Edinburgh, hereby notify that they will receive models for a colossal statue of Wallace, in bronze, with basement of granite blocks, to be placed on the mound in the northwest part of the Duthie Public Park, near the city of Aberdeen, in conformity with instructions left by Mr. Steill, at a cost not exceeding £3,000.

Intending competitors, on application, accompanied with a remittance of 10 *s.* 6 *d.*, to Mr. John Otto Macqueen, 10 Bridge Street, Aberdeen, will be supplied with copies of (1) Mr. Steill's instructions, (2) conditions of the competition, and (3) lithograph plan of the Duthie Park, showing sections of the mound.

The author of the accepted model will be employed to execute the work, and the author of that next in order of merit will receive a premium of £50. The trustees do not, however, bind themselves to accept any of the models.

All models must be in conformity with the above conditions, and must be delivered in Aberdeen, free of expense, addressed to Mr. J. O. Macqueen, Municipal Buildings, Aberdeen, **not later than July 1, 1884.**

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MONUMENT.

[At Milwaukee, Wis.]

The committee in charge is now prepared to receive designs and proposals for the erection of a granite monument on the lot in Forest Home Cemetery, in memory of the victims of the Newhall House Fire. The cost of the monument must not exceed $3,000, including the lettering on the monument of the names of the victims.

The foundation will be laid even with the surface of the ground, at the expense of the committee.

The monument is to be erected as early as possible in the season of 1884, and designs and proposals should be sent in **not later than the first day of January, 1884.**

The committee reserves the right to reject any or all of the designs or proposals submitted.

Proposals may be sent to, or any further information obtained from,

WM. P. McLAREN,
414 Chairman Committee, Milwaukee, Wis.

PROPOSALS.

GRAVING DOCK.

[At Esquimalt Harbor, British Columbia.]

Department of Public Works,
Ottawa, November 12, 1883.

Sealed tenders, addressed to the undersigned and endorsed "Tenders for Graving Dock, B. C.," will be received at this office until Friday, the 8th day of February, 1884, inclusively, for the construction and completion of the partially finished Graving Dock, at Esquimalt Harbor, British Columbia, according to plans and specifications to be seen **on and after Monday, the 24th December next,** at the Department of Public Works, Ottawa, and on application to the Hon. J. W. Trutch, Victoria, B. C.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and prices affixed to the whole of the items stated therein, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank check for the sum of $7,500 made payable to the order of the Honorable the Minister of Public Works, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the check will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
417 F. H. ENNIS, Secretary.

WATER-WORKS.

[At Fort Smith, Ark.]

The Board of Aldermen of the city of Fort Smith, Ark., desiring to obtain a system of water-works, will grant a liberal franchise to a company willing to erect and operate the same. To that end propositions will be received up to the **first Monday in February, 1884.** For information address

ED. M. KENNA,
418 Chairman Committee on Water Works.

IRON LATTICE PARTITIONS FOR VAULTS.

[At Chicago, Ill., Philadelphia, Pa., New Orleans, La., and Washington, D. C.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., November 23, 1883.

Sealed proposals will be received at this office **until 12 m., on the 18th day of December, 1883,** for supplying and fixing in place, complete, the iron lattice partitions required for the silver storage vaults, in the custom-house and sub-treasury building at Chicago, Ill.; post-office and court-house at Philadelphia, Pa.; custom-house and post-office at New Orleans, La.; and treasury department building at Washington, D. C., in accordance with drawings and specification, copies of which and any additional information may be had on application at each of the above buildings and at this office.

M. E. BELL,
414 Supervising Architect.

PIPE AND SPECIAL CASTINGS.

[At Catskill, N. Y.]

Catskill, N. Y., November 12, 1883.

The Board of Water Commissioners of the Village of Catskill, N. Y., will receive bids **up to 3 o'clock, p. m., December 3. 1883,** for the following quantities of cast-iron pipe, viz.:—

1,452	feet of	12″,	weight,	1,004	lbs. per	length.
3,288	"	10″,	"	766	"	"
4,356	"	8″,	"	557	"	"
9,900	"	6″,	"	377	"	"
24,926	"	4″,	"	226	"	"

Also the price per pound for specials.

The Board reserves the right to reject any or all bids.

The pipe to be delivered at Catskill, N. Y., on or before the first day of May, 1884.

E. LAMPMAN, President.
W. S. Parker, Engineer. 414

ELEVATORS.

[At New York City.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., November 16, 1883.

Sealed proposals will be received at this office **until 12 m., on the 5th day of December, 1883,** for furnishing and erecting two steam freight elevators, one in the Assay Office Building, and the other in Public Stores Building, cor. Laight and Washington Sts., New York City, in accordance with specification, copies of which and any additional information may be had on application at this office or the office of the Superintendent of Repairs at New York City.

M. E. BELL,
414 Supervising Architect.

PUMPING ENGINES AND BOILERS.

[At Catskill, N. Y.]

Catskill, N. Y., November 12, 1883.

The Board of Water Commissioners of the Village of Catskill, N. Y., will receive bids **up to 3 o'clock, p. m., December 3, 1883,** for two pumping-engines and boilers complete, of the capacity of seven hundred and fifty thousand gallons each per day.

Plans, specifications and requirements can be had on application at the office of the Engineer.

The Board reserves the right to reject any and all bids.

E. LAMPMAN, President.
W. S. Parker, Engineer. 414

CONCRETE SIDEWALKS, GRADING, ETC.

[At Philadelphia, Pa.]

Public Buildings, Pennsylvania Square.

Sealed proposals will be received at the office of the Commissioners, in the buildings, **until 12 o'clock, noon, of Tuesday, December 4, 1883,** for all the grading, concrete and permanent covering required for the sidewalks on the east, south and west fronts of the buildings.

The covering must be of suitable and well-approved materials, natural or artificial, laid in the best manner, complete.

Each proposal must be accompanied by a sample of the material proposed, together with description in detail of the manner of laying, and, if artificial, of its composition, and places and dates where and when used.

Full particulars as to form and every detail and requirement of the proposals, with the necessary blanks and envelopes, may be had on application at the Architect's Office in the Buildings, second story, south front.

The Commissioners reserve the right to reject any and all bids.

By order of the Commissioners.

SAMUEL C. PERKINS, President.
Attest: F. Dehaes Janvier, Secretary. 414

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

A SERIOUS attempt is now making in New York to compel the removal of electric-light wires from the streets; the occasion chosen for the struggle between the electric-light companies and the public being the trial of a suit brought by Mr. Henry N. Smith for an injunction to restrain the United States Illuminating Company from erecting poles and wires in front of his land on Forty-third Street, between Fifth and Sixth Avenues. Distinguished counsel are employed on both sides, and the most eminent experts in the country have been called upon for testimony. As might be expected, the Edison Electric-Light Company, which takes special pains, as the public is frequently informed, to carry its conductors under ground, and to adopt all possible precautions against accident, has interested itself on Mr. Smith's side of the question, and seems to have lent the aid of its own lawyers, as well as some of the best expert testimony, for the support of his cause. The main motive of the plaintiff in praying for the injunction seems to have been the fear that he feels lest some accident should happen to him or his friends from the dangerous wires stretched so near his estate, or perhaps the corollary from that apprehension, that a similar dread on the part of intending purchasers might reduce the price which he could obtain for his property if he should wish to sell; and as the dangerous character of arc-light wires is too notorious to be disputed, it must be confessed that his appeal to the courts for protection seems natural and reasonable. Unfortunately, it appears probable that the decision will turn finally, not on the merits of the case, but on the question whether the stretching of the wires through the streets has, or has not, been authorized by the Legislature and the city government; the matter of the dangerous or innocent character of the wires not being, in the judge's opinion, material to the case.

TO the ordinary mind it would seem that it ought to make a good deal of difference, in deciding as to the propriety of stretching wires in front of a man's estate, whether the wires would be mere bits of harmless metal, or were to be kept charged with a force which would inflict instant death upon any living creature which happened to touch them without special precaution. To quote the apt illustration of one of the daily papers, a street or city through which arc-light wires run above ground is like one in which volleys of rifle-bullets are continually being discharged at certain heights. So long as a person keeps out of the way of the bullets, they do him no harm, but he is obliged to restrain his movements within a comparatively narrow space, or run the risk of sudden death by coming inadvertently within range of the fatal messengers; while, even at the best, a shot will occasionally go astray, and kill or injure persons to whom no lack of care can be imputed. As an example of the latter class of occurrence, one which is said to have happened in New York while the trial was going on is interesting. According to the account, some runaway horses in Fifth Avenue came in collision with an electric-light post and broke it down, trailing the wire on the pavement. A carriage soon came by the place, and the horse stepped upon the wire, receiving the whole current through his body, and falling dead on the spot. A moment later another horse also came up and also stepped on the wire and dropped dead. The police, discovering that something was wrong, then stopped travel through that portion of the street, and no more casualties occurred. Fortunately, the night was stormy, and very few people were passing. In any ordinary evening a crowd would have gathered in a few moments after the throwing down of the post, and would have trampled about and over the wire in every direction.

A GOOD illustration of the way in which fire spreads through the high, combustible buildings which, under the name of ordinary apartment-houses, are beginning to menace the lives of so many innocent persons, is to be found in the account of a recent occurrence in Boston, where the flame from a kerosene lamp, overturned in the basement of a handsome five-story building of the kind, immediately climbed up the elevator-well to the roof, spreading out at each floor into the adjoining rooms, something in the way that the flame from the match runs over the "set-pieces" of Fourth-of-July fireworks. Fortunately, some one in the building had sense enough to give the alarm, and the occupants of the various apartments were hastily awakened, just in time to escape in their night-clothes, leaving their furniture and other property to be spoiled by the smoke and water. The fire-service of Boston is admirable, the distances short, and the house was situated on a corner, where streams from the hose could be brought to bear upon it from three sides; but notwithstanding all this, the interior of the building was very seriously injured before the flames were subdued. "Fortunate" as it is that the occupants escaped with their lives, we venture to say that they would consider themselves still more fortunate if they could have been spared altogether the experience of leaping at a call from their beds, to run half naked into the inhospitable street in the middle of a cold winter's night; and some, at least, of them will certainly suffer serious results from the fright and exposure.

AN admirable scheme is just going into operation in New York, where technical education has for some years been pursued with extraordinary zeal and success. The new plan proposes to apply to the teaching of a particular branch of technical knowledge the "correspondence system," or, as it is often called, the "Chautauqua system," in which instruction is given by means of carefully prepared lesson-papers and questions for examination, sent through the mails, and replied to in the same manner. The honor of being the first school of the kind to adopt a method which must soon be followed by many similar ones belongs to the trade-school of the Carriage-Builders' Association, which has made all needful preparations for extending to pupils in any part of the country the advantages hitherto offered only to those in New York. The regulations of the carriage-builders' correspondence school provide that all intending pupils must be employés or apprentices of established carriage-builders, or members of accessory trades, and must be recommended by their masters or employers as fit persons for admission to the advantages of the school; and a nominal tuition fee is required of one dollar from each apprentice, and two dollars from each journeyman or other employé, which covers all the cost of instruction through the school year, ending May 1. The pupils are required to provide themselves with drawing instruments and paper, or may purchase them at cost price through the school if they desire. One or more lesson-papers are mailed to each pupil every week, with the necessary explanations and directions printed upon them, and the responses, which take the form of drawings or written replies, according to circumstances, are mailed to the school, and there examined, corrected and returned. The selection of papers is made to suit the capacity and industry of each pupil, and at the close of the school year diplomas are awarded to those who have done most to deserve them. The regular correspondence includes suggestions as to text-books to be read by the pupils, and in addition to this, answers are given to

questions relating to points in the lesson or examination papers, or to any detail connected with the trade. We are glad to extend, so far as we may, the announcement of this most promising movement, and to refer all those who wish for further information to Mr. John D. Gribbon, instructor in the school, at No. 214 East Thirty-fourth Street, New York, and only regret that we cannot make sure of conveying such good news into every country wheelwright's shop in the United States.

THE Prince of Wales seems to inherit the interest of his lamented father in matters relating to the material welfare of his future subjects. Encouraged by the remarkable success of the Fisheries Exhibition, which he did much to promote, he is now said to be engaged in efforts to secure similar success for the Health Exhibition, which is intended to be held in London next year. Already the Corporation of London has signified its willingness to aid the enterprise, if necessary, by a gift of seventy-five thousand dollars, and the Government is very likely to do at least as much for the cause. Like the Fisheries Exhibition, the Health Exhibition is to be international, and efforts will probably be made to secure the best possible representation from foreign countries. So far as ordinary sanitary appliances go, it is certain that no country can furnish an exhibit to compare with that of England itself, that being the country, above all others, where physical purity is held in the highest honor, and secured by the most ingenious means, but there are many other allied matters in which much can be learned from other countries. In heating and ventilation, for instance, the palm would probably be disputed between Germany and the United States, the best modern buildings of these two countries being apparently about equal in merit, and far superior to any yet constructed elsewhere. It is to be hoped that the present practice of sewage disposal will be fully illustrated, all nations being equally interested, and having progressed about the same distance, by different roads, toward the solution of this great problem. If Great Britain, with one hundred and fifty towns disposing of their wastes to their own satisfaction by irrigation, can show the greatest number of examples of this mode of treatment, the accounts seem to indicate that our own town of Pullman, a very advanced specimen, by the way, in other respects, of the best American sanitary practice, can show results more successful than those of any English town; while Milan, Paris, Edinburgh, and probably many other cities and villages, near which disposal by irrigation has been going on quietly for centuries, will have their share of valuable information to contribute.

WE have received a circular from Mr. Henry Lord Gay, of Chicago, announcing that a project has been formed, under his direction, for establishing in that city a "Permanent Exposition of Building Arts and Appliances," which is to comprehend all sorts of materials, manufactures and inventions useful in building. The exhibition is to be free to the public, and to be supported by the reasonable charge of five dollars a square foot per year for the floor space covered by the exhibit of each person who may avail himself of the advantages which such an exhibition offers, for introducing and advertising new appliances and materials. The attendants will distribute circulars and pamphlets, and will give to visitors any necessary explanations of the objects shown, so that exhibitors will be at no expense for maintaining attendants of their own, although they will be at liberty, as we understand the circular, to do so if they wish. We are glad to see that the promoters of the undertaking are so well assured of its success that they have secured an immense building in the heart of the city, furnished with elevators and other conveniences, and presenting an area of twelve thousand square feet on each floor. There can be no doubt of the great interest and value of such an exhibition to all who concern themselves with building matters, and it is much to be hoped that Mr. Gay may find the results of his enterprise in every way satisfactory. A promise is given in the circular that when the Chicago exhibition shall have reached substantial success, a similar one will be established under the same management in New York, and possibly in other large cities, both east and west. We are sure that all architects will gladly lend their aid in preparing the way for the formation of collections which will be of so much, and such constant service both to them, and under their advice, to their clients.

A PAPER has just been published in Geneva by M. Colladon, a physicist of some distinction, upon the mode in which fire is kindled in buildings by lightning. As an example which both shows clearly the circumstances under which the electric movement is transformed into fire, and indicates the mode in which this result may be prevented, M. Colladon cites the case of a large barn in a village near Geneva, which was set on fire by lightning this summer, and consumed in a few minutes. The roof of the barn was supported by ordinary trusses, with king-rods of iron, and the ridge was covered with a saddle of tin. The main part of the building was filled with hay, and pipes led from the cellar to a reservoir of water not far off. According to M. Colladon, the lightning was first attracted in its downward course by the tin-covered ridge, and from this ran down to the end of the iron king-rods. The best conductor in the direction of the earth was now the reservoir and the water-pipes communicating with it, but to reach these it was necessary for the current to force its way through the non-conducting and combustible hay, setting it on fire by the energy of its motion. If, as M. Colladon says, a passage had been provided for the charge, by means of a rod of iron connecting the nearest king-rod with the reservoir, the current would have followed this course in preference to attempting the more difficult journey through the hay, and the fire would not have occurred. The lesson to be drawn from this instance is that the danger of fire from lightning may be much diminished by connecting the scattered portions of metal which enter into the construction of every house by good conductors, and the whole system with the ground. Then the transmission of electricity will be direct and harmless, unless a charge should pass so heavy as to leave the conductor, which would be a rare contingency.

THE New York *Tribune* mentions that the Daft electric motor about which various accounts have been published, was tried a few days ago on an ordinary railway near Saratoga. A third rail had been laid in the middle of the track, through which the electric current was conveyed to the motor, the current being generated by an engine of twenty-five horse-power in a building about five hundred feet away. A passenger car, containing about fifty persons, was attached to the motor, and several more rode on the motor itself. The current proved strong enough to draw the engine and the car a distance of something more than a mile in eleven minutes, up a grade of about seventy feet to the mile. On the return trip the motor ran off the track, and was broken to pieces, the passengers escaping with a few severe bruises. Considering the circumstances, the motor may be considered to have shown good promise of future development, although, as the *Tribune* sarcastically remarks, twenty-five horses might, it would seem, have dragged the little train with sixty passengers, a mile and one-eighth in eleven minutes without the help of electrical apparatus.

THE French occupation of Tunis has already resulted in a certain amount of benefit to several of the sciences, and amongst others to archæology. An official expedition, which was recently sent out for the purpose of investigating one or two districts known to have been in classical times the seat of important settlements, succeeded in identifying the position of the ancient city of Gicthis, once a thriving commercial town, but now presenting only a great extent of scattered ruins. In this place the remains of the buildings which were still visible indicated massiveness of construction rather than richness of ornament, and very few sculptured pieces were found; but not far away, on the island now called Djerba, were discovered the fragments of a rich and magnificent town, probably the capital of the island, and dating apparently from a period before the Christian era. Some hasty and incomplete excavations were made at this place, resulting, however, in the uncovering of the ruins of a large temple, situated close by the sea, and a little removed from the town. The temple was of extremely rich and costly construction, the whole being of marble, in blocks of immense size. The principal front was adorned with columns, the shafts of which were of green and red marble, and twisted columns were found in the interior order. Statues, of red Egyptian granite, lay on the ground about the temple, but for some unknown reason, the heads of all of them had been cut off and carried away, not one being found in or near its place. Among the houses in the town itself were found great numbers of beautiful mosaic pavements, but the time did not permit of more extended explorations.

STROLLS ABOUT MEXICO. — II.

Buried Figure near San Juan Teotihuacan.

ON a recent Sunday, with two friends, I visited for the first time the famous pyramids of San Juan Teotihuacan. These pyramids are near the line of the Mexican or Vera Cruz Railway, the station being about an hour from the capital by accommodation train. I took the mixed train, leaving the Vera Cruz station at 10.30 o'clock. This station, by the way, looks as if it had been transferred from a French or German city; it is new, and of a quietly elegant Renaissance. The stone is a whitish gray, susceptible of beautiful carving. The main portion of the head-house has two stories, flanked by wings of one story, and the train-house has a roof of iron. Hardly any wood is used about the structure, the platforms, of course, as in all this part of Mexico, being of stone. The European aspect is heightened by the English coaches, which, with their primitive appliances, compare unfavorably with the handsome American trains of the neighboring Mexican Central and Mexican National Railways.

Of all the railways centering here, the Vera Cruz Railway has the dreariest approach to the capital, and after his day's travel amid magnificent mountain scenery the traveller's first impression of the ancient city would be particularly unpleasant by contrast, were it not that the last hour or so of the journey is made in the dark. But that morning we had the full sight of the twenty miles of arid alkali marshes which border Lake Texcoco, making a most depressing foreground for the sublimity of the distant mountains. The lake is finally passed, however; we are no longer half-suffocated by alkali dust, and we enter a more garden-like country, the vegetation gratefully green under the almost daily summer rains of the valley, and brilliant under the intense sunshine of the morning.

San Juan is the second station out from the city, and as we approach it we see the two great pyramids standing in the plain. The neighboring mountains being conical in shape, the pyramids resemble foot-hills, and would hardly be recognized by the casual observer as works of man. The humble dwellings of San Juan are more scattered than the houses of the average New England farming community. We pass by a particularly ugly church, with a freshly white-washed tower, and leaving the *Camino Real* or highway, strike across the fields in a bee-line for the pyramids, about two miles away. There is an abundance of the national plant — or tree, it might be called — the nopal, or prickly-pear cactus, and in some fields they have an orchard-like appearance, which might deceive one were it not evident that the picturesque growth is too common to induce its cultivation.

The paths led across the fields, following their boundaries between thick stone-walls a few feet apart. As we neared the pyramids we saw that the plain around was dotted by numerous minor mounds, and since the larger pyramid is called the Pyramid of the Sun, and the other, the Pyramid of the Moon, it seemed as if the small ones might be named for the stars. We passed through a broad avenue, as it might well be termed, bordered by these mounds placed at regular intervals on either side. It was, perhaps, the main thoroughfare of the populous city that anciently occupied these plains. Here and there were long steps cut in the stone bordering this way, and remains of old cement pavements. It must have been a stately avenue in its day. Whether these mounds are remains of the ancient dwellings, or had religious uses must be left for authorities like Adolph Bandelier and Frank H. Cushing to say.

The multitudinous ruins and relics give evidence of a very large population on this spot in the ancient days. When near the first pyramid, or that of the Sun, we crossed a field of maize. The ground was sprinkled with bits of obsidian, or volcanic glass, probably chips from the armories of the primitive dwellers. Here and there were broken arrow-heads, spear-heads, and knives of this material, with occasionally a perfect specimen. This obsidian varied in color, some of it being like common bottle-glass, while other pieces were of a beautiful pearly gray, or smoky topaz hue. Fragments of pottery were equally plentiful. Teotihuacan is believed to have been a Toltec city. I chanced to have a bit of ancient Zuñi pottery in my pocket, which I had picked up near Fort Wingate in New Mexico, and I was struck by the close resemblance in the style of decoration. — Mr. Cushing believes the Zuñis to have been either Toltecs, or closely allied to them.

Occasionally we picked up fragments of terra-cotta work: broken heads or faces. It is astonishing how these antiquities prevail in Mexico; the ground is literally sown with them. It is a mistake, the report that these relics are manufactured by the Indians for the benefit of tourists. In the first place, there are not yet enough tourists to justify enterprise of the kind; and in the second place, it is much cheaper for the natives to dig them than to make them, for they could not afford to make them and sell them at the prices which they take, even with the present low cost of labor in the country. The relic-selling natives of Mexico, and even the merchants in the city, are much more modest in their prices than are the pueblo Indians of New Mexico. One of my companions had been over this field before, when it had just been plowed, and he picked up a large number of these terra-cotta fragments: every plowing turns up a fresh crop, and the supply seems almost inexhaustible. A little Indian boy was crossing the field with a sack over his shoulders; it turned out to contain a large number of the relics. He seemed a little troubled that we should be searching for the same things, and with the spirit of one of our little country boys jealous against intrusions on his secret huckleberry patch, he assured us there were no more, that he had gathered them all! We bought a goodly number of him for a *real*, or about twelve cents. They were all of about the same size, an inch or two in diameter. Some were heads, probably of figurines, for there were also broken-off arms and legs; others were reliefs. The variety in types was considerable; some were evidently realistic, and others mythological in character; others were strikingly Egyptian in style, and still other heads seemed thoroughly idiotic in form. One relief had what looked like a cowl and mask, another was marked by a most comical grin, and another was slashed like a tattooed person: one face in relief, with an elaborate crown, had its eyes rimmed with what looked like spectacles, and it might perhaps lead a closet archæologist to write a learned essay on optical science as known to the Toltecs. One curious little head, which closely resembled one of the mythological dance-characters of the Zuñis, was pierced as if to be worn as a charm or amulet. There were also some animal heads, including a well-modelled head of a tiger. Over in the neighboring town of San Martin there is a most interesting store devoted to the sale of relics from Teotihuacan, but unfortunately we did not get time to visit it.

We engaged the boy to go with us to the pyramids, and on the way we stopped at his parents' house, a little stone hut bare of furniture of every description. The boy's mother greeted us courteously, but said she had nothing in the house to eat, which disappointed us considerably, as we had only taken the customary cup of coffee before starting, and expected some tortillas at least. There were plenty of tunas growing on every hand, however, and the boy climbed the trees to gather them for us. We had previously tried gathering them, but had given it up after filling our fingers with the provoking little prickles which cover the fruit. The boy did not mind these in the least, however, and deftly tore open the skins with his finger-tips, presenting us with the cool, dark-red, and seed-filled pulp, in flavor something like a water-melon, and most refreshing. I believe the pyramids have been measured, but I cannot lay hands on the figures: hazarding a guess I should say that the Pyramid of the Sun is between one hundred and fifty and two hundred feet high, and that of the Moon something like fifty feet lower. We found that their bases were perfect squares. It took about five minutes to climb to the summit of the first pyramid; it appeared to consist of a mass of small volcanic rocks, and the surface was now dilapidated and overgrown with shrubs and cactus, so that it seemed much like a natural hill. The top was flat and square, and commanded a broad view over the valley. In ascending we observed two broad level intervals, and from the neighboring Pyramid of the Moon the structure was clearly shown, two terraces dividing the great pile into three sections, each apparently of the same height.

On the way to the Pyramid of the Moon, about half-a-mile distant, we stopped to see one of the most interesting features of the locality, the head of a gigantic stone figure or idol, standing about six feet above ground: it is said that the rest of the figure below ground is something like five times the length of the visible portion. The mound around is now a shapeless mass: possibly it might have been the site of a temple, and the figure thrown down by the conquerors. Behind the figure is the opening of an underground passage, which a friend who crawled in said was a hundred feet or so long. The figure shows a rude face, now noseless, and is well hewn. The top forms a square, altar-like cap, and a channel cut through the centre across the surface perhaps indicates that it was used for sacrificial purposes, although the Toltecs are said to have made no human sacrifices.

The Pyramid of the Moon showed its structure better than its larger neighbor. Where the surface had been cut away to make place for a path which zigzagged up to the summit, where a rude cross had been erected, a layer of cement could be seen which evidently ran entirely through the pyramid on a level. Other patches of cement followed the slope of the side, and it looked as if the pyramid might once have been covered with a shell of masonry, which had been removed from time to time to furnish building material for the neighborhood.

On our way back we asked Felipe if we could not get some white tunas, as we were hungry, but wished to vary our diet somewhat. We felt as if we had been feeding on watermelons! Felipe said that he knew an old woman who had a tree of white tunas. We descended into a hollow beside the road where there was no sign of a habitation, but found that the side toward the road was a ledge, in which was a cave with two doors. Felipe peered into one of these, and an ancient crone, who almost might have been the Witch of Endor, came crouching out. The boy told her of our wishes, whereupon she took a long pole with an iron hook in the end, and proceeded to gather the fruit from a high tree and place it in a basket. Meanwhile Felipe was making fun of her for living in a cave, as though there were something uncanny about it, but as we peered inside we saw that it was far more comfortable than his habitation, and really had considerable furniture. When the old woman had gathered about a peck we said that was enough, and we sat down on a stone to eat them as she deftly opened them with a knife; they had a delicious, spicy flavor, sweeter, and with more body than the red tunas. As we threw away the rinds a number of little pigs came up and devoured them. "*Esos*

son puerquitos" (those are little pigs), said the old woman, who was stone deaf, and talked as if she were giving an elementary object-lesson in natural history to some little children. "Those are little pigs; they make lard and ham of them, — not of *them*, but when they grow up, like *those*," she said, as some huge grunters came into sight.

"Would you like to see my house? It is a cave," she explained, as we followed her down the steps. There were two rooms, and both were neatly kept. The only way for the smoke of the fire to escape was through the door. A strong smell of incense pervaded the air. In the other room we noticed on the wall a large old oil painting, evidently the spoil of some church; in the dim light, aided by a match, we could see that it was well painted, subdued and agreeable in color, and gracefully correct in drawing; it was an "Ascension," and had some beautiful figures; possibly it was the work of some Spanish master, more or less famous.

We paid her for the tunas; she wanted only a *medio*, or six cents, and as we handed her the money she muttered that she did not mean the Señor Cura to get hold of it, which indicated that the parish priest was inclined to press his flock rather closely.

Just then her husband, a very old man, appeared. He yelled at us most cordially; — he was so accustomed to pitch his voice to the ear of his spouse. "Would we care to see an ancient relic?" and he brought forth from the obscurity of a recess of the cave, which we were unaware of until then, a large stone vessel, a shallow vase with a rude sculptured face, showing the same style as the huge figure we had seen at the pyramids. He said it was worth one hundred dollars, but we could probably have bought it for ten, or even five, had we been so inclined. He was disposed to loquacity, and was evidently proud of his cave-dwelling; he said that his fathers had lived there before him.

At the railway station we asked the agent if we could get nothing to eat or drink around there. "Eat? No! *Es el verdadero país del hambre* (it is the genuine land of hunger); but you can get something to drink across there at that little tienda, the Porvenir Futoro, or Futuro Porvenir, whichever it is," alluding contemptuously to the redundant title of the "future to come," as the humble little shop was called; but we found some bread there, and the friendly proprietor got his wife to fry some sausages for us, with which, and a glass of Catalan, the native distillation from molasses, we managed to stave off famine until we reached the capital. SYLVESTER BAXTER.

SPANISH ARCHITECTURE.[1] — V.

THE ALHAMBRA (*continued*).

THE "Court of the Lions" is probably the best known portion of the Alhambra, and with the various chambers grouped around its sides and eastern end, constituting the domestic and harem quarters of the palace, it is the most complete of all. It is quadrilateral in form, about 115 feet long by 66 feet broad, surrounded by arcades supported upon slender marble columns, alternately single and coupled along the sides, with groups of three to turn the angles. The composition is still further varied by pavilions in the centres of the two ends projecting into the court, with columns and stalactite arches similar to the peristyle. There are small fountains, like the one in the "Hall of the Two Sisters" within the pavilions, and four marble channels conduct the overflowing water from the four sides toward the centre. There is placed the fountain which gives the court its name. It is a large twelve-sided bowl of alabaster enriched with mouldings, and with a long Arabic inscription couched in the most exaggerated terms of praise, such as these: "Look at this mass of pearl glistening through the air, spreading its showers of prismatic bubbles. . . . Beholding the basin one might imagine it to be a globe of solid ice, with the water melting out from it, for it is impossible to see which of the two is really flowing . . . like a lover's eyes pregnant with tears;" and of the lions, "O, thou who beholdest these crouching lions, fear not! life is wanting to enable them to show their fury." This reminded me of "A Midsummer Night's Dream," where Bottom exclaims, "I would entreat you not to fear, not to tremble," at his personation of what he calls the "most fearful wild-fowl living." The twelve lions of the Alhambra fountain are queer looking creatures, angular and stiff as the most primitive wooden toy, with straight posts for legs, and water-pipes protruding from their mouths. Still they are less offensive, and more fitted for their position than many a modern casting which tries to be a veritable lion; and the effect of the many fountains in action, with the tiny rivulets coming from the interiors on each side is very pleasing indeed. The court was lately occupied by a somewhat undisciplined garden growth, which has now been cleared away. Doubtless the place is better without it, yet there was something wanted to redeem the ground from that utter bareness which was its condition when I saw it. The walls behind the arcades are in many places restored. The plaster decorations renewed are, however, of undoubted authenticity, as they are cast from moulds made upon the best preserved of the ancient remains, of which there is an abundance for the purpose. The color is of course nearly all gone in those parts somewhat exposed to a not very merciful climate. Indeed, it is marvellous that such a light, fragile construction of wood and plaster (the arcades are hollow like those previously referred to) should endure so long.

This section of the palace was probably built A. D., 1325, by Abou Abdallah, and the court has been for five centuries, therefore, open to the weather. The chief beauty of the detail is in the capitals and arches, all alike in general form, but abounding in variations of detail. The capitals (*see Illustrations*) are surmounted by blocks ornamented with an inscription in Arabic character, which is exceptionally graceful in form, and the arches are stilted upon little shafts enclosing panels of rich leaf-work. There is a charming contrast in this ornamentation between the inscriptions and the other forms; at a little distance a sort of texture of surface is seen which enhances the excellent proportions. Some traces of color can be discerned, but not enough for restoration with any degree of certainty. It is clear, however, that color was used to heighten the effect of the forms, and to decorate those surfaces (such as the hollow of the abacus) which look bare by contrast without it.

Some authorities assert that the shafts also were colored or gilded, and although that seems to be true of some examples it is scarcely likely that it was the general custom. We find descriptions extolling the beauty of marble for its own sake, and sometimes mentioning the beauty of the polish in such terms as render it very certain that no paint or gold was used on it except, perhaps, as an enrichment in line or other delicate drawing, only partially concealing the material. Several experiments in restoring the color have been made at various times, and in various parts of the Alhambra. The baths are completely restored, and painted; and besides these I found some bits here and there, a few feet each, of modern essays, but they nearly always looked crude notwithstanding the evident care in harmonizing them; and I doubt very much whether the work of the Moors themselves was not harsh and strong when new. It does not appear at all likely that greater skill was attained by these (or any other colorist of ancient times) than is now by the leaders in art who attempt, often unsuccessfully, to use strong primary colors in restorations. It is certain that strong colors were used, and it is equally certain that examples that remain to us are often superb harmonies which seem almost mysterious in their perfection, yet I feel assured that time would do the same gentle service for the modern work, softening and toning it to the same beauty. It is doubtful whether any essential secrets of art are involved other than those worked by time. So I feel satisfied that the color decoration lately done in the Moorish baths will in a few years acquire what it now lacks—unless defective materials have been used. There is a vast amount of abuse of this age wasted in comparisons made by persons who, thoroughly well acquainted with the old work they adore, yet do not know enough about that of their contemporaries which they depreciate; and a goodly amount of this kind of criticism falls upon modern color, not only upon that which is irrevocably rank and bad (of which we all know there is enough), but upon the work of artists as able as ever lived, who are condemned simply because they cannot condense the breath of years upon their work while the critic waits. My delight in the beauties of the old-time artists was not lessened by the conviction that it is not hopeless to try to rival them.

There is a good deal of color left in fairly good condition in the apartment called the "Hall of Justice," a very beautiful gallery divided into a series of squares by cross arches. Besides the conventional painting upon the carved plaster there are here several pictures scarcely consistent with the Moorish laws of ornament, although they are all of Moorish subjects, and executed to the honor and glorification of that race. It has been surmised that they were painted by an Italian artist. One series among them, depicting a number of patriarchal Moors in council, has originated the name given to the hall. It is probable that it was one of the private apartments. Some more of the original coloring is to be seen in the "Hall of the Abencerrages," a very beautiful chamber, with stalactite roof in the same style as the "Hall of the Two Sisters." This room, the story asserts, was the scene of Boabdil's awful massacre of the men whose name it bears. One after another they were decapitated until the fountain was filled with their blood and their heads, and to this day certain stains on the marble floor are pointed out as evidence of that tragedy.

Although I have unfortunately no drawings to illustrate the "Hall of the Embassadors," I cannot pass it unnoticed. It is best approached from the "Court of the Fish-pond," across the north end of which the great tower containing it rises behind a beautifully proportioned arcade and vestibule. The arched inner doorway, through a wall of enormous thickness, has in its jambs prettily contrived niches to receive vases, perhaps for drinking water. The inscriptions around them, which here as elsewhere, constitute an important portion of the ornament, include one as follows: "If any one approach with thirst he shall find water cool and limpid," etc.

Passing these agreeable hospitalities one enters the "Tower of Comares" and the Hall, which was undoubtedly the chief state reception-room. The interior is about 35 feet square and 60 feet high, decorated with a splendor of form and color equal to any in the

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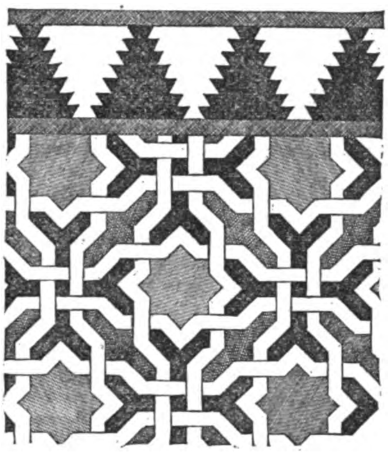
[1] By Robert W. Gibson, Travelling Student of the Royal Academy. Continued from page 245, No. 413.

palace. The ceiling is of wood, an "artesonado"[1] dome with intersecting ribs and geometric panelling, all rather dark and gloomy now, but originally a blaze of gold and colors. In each of the three walls (the first being occupied by the entrance archway) there are three recesses, little chambers or alcoves in the thickness of the masonry, with windows in their outer sides, and larger arches toward the hall. They are in fact simply windows, but the size of the wall and the original beauty of the treatment make them unlike any other windows in the world. The tower projects beyond the line of the fortification, and these nine windows command superb views.

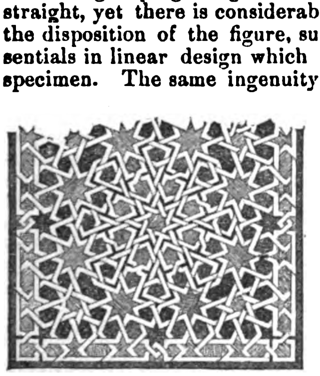
The azulejo dado is exceptionally fine. Beside the usual elaborations in the mosaic of tile there are some individual pieces, which are gems of minute art, worked in as centres of the design. There has been a good deal done here since the original artists left it; Charles V and other monarchs caused alterations and repairs to be done at different periods, but the general effect is undisturbed, except as it has faded in age. In the details—in some of the tile-work, for example—there are monograms and mottos which, upon close inspection, prove to be those of the Christian kings. Evidently, they were substituted for the originals to gratify the conquerors.

These azulejo dados in the Alhambra are very interesting. Being of glazed-tiles their coloring is still vivid and full, although there are evidences of decay in parts where the glaze is disintegrating and chipping off. They are composed of tiles of complex shapes: perhaps one of the characteristics of Oriental tile design, as compared with European, is this invention of a form which combines with its own counterparts in numerous changes, and produces elaborate figures without further design on the part of the workman. Sometimes patterns of considerable complexity are managed with only two shapes of tile. The white, interlacing bands in the wall-tiling of the vestibule to the "Hall of the Embassadors," are entirely made of two shapes very ingeniously arranged. Not only is the figure determined in them, but the interlacing (each band going alternately "under and over" those it crosses) is automatic, so that a dull workman could hardly make a mistake in setting the design. And there are only four other shapes; that is a total of six different tiles to produce one complete repeat of an elaborate pattern. In some cases the design is extended to alternations of color in the stars, with a distinct gain in interest. Black, white, buff, blue, purple, green, and a brownish yellow, are the most frequent tints, the interlacing lines being usually white.



Wall-Tiles, from the Vestibule to the "Hall of the Embassadors."

The greater number of the designs in the Alhambra are more complicated than that just described. That, as may be seen, is based upon rectangular lines and diagonals, others are worked to radiating centre lines, at 67½ degrees with the horizontal, as if two sets of rectangular lines were combined, the lines of one set bisecting the angles of another. This will be seen in the example from the "Hall of the Two Sisters," a design which shows much advance from the last. The radiating principle here made prominent is accompanied by a circular grouping of great value; for although all the lines are straight, yet there is considerable expression of a circular curve in the disposition of the figure, supplying very cleverly one of the essentials in linear design which is wanting in the first (an earlier) specimen. The same ingenuity appears in the shapes of the tiles, and the same accuracy of interlacing. The latter, indeed, seems to be almost a mechanical necessity; yet if a novice attempts to originate one of these designs, he will find this simple interlacing the most perverse thing in the work. The first essential in setting out and arranging these designs is extreme accuracy. Their existence shows to what a degree of perfection in geometrical science their inventors had advanced, not alone by their forms, but by the fact that they were so highly appreciated in their untempered purity. The Normans and Goths with a good deal of appreciation for interlacing and geometrical movements, always, intentionally or not, got their attempts at such ornament, simple as they were, full of queer inaccuracies and "fudgings." But the Moor was a mathematician even more than an artist, and his drawing was so accurate that the modern student with all his instruments has to bring unusual care to the task of copying it. The smooth, rich solidity of these dados, forming a basement three or four feet high to the lighter plaster-work, contributes not a little to the fine effect of all the principal apartments. The tiles seem to have been laid together in the workshop, probably face downward; then backed with sufficient thickness of plaster to enable them to be set in position in slabs; and the pattern was then filled in and made continuous, so that the lines of junction should not show. The raised plaster-work was somewhat similarly executed. The first piece having been carved, and, when so required, arranged to repeat, a mould was made from it, and the desired number of slabs cast; these were bedded upon the walls, and the lines of jointing all filled in with similar plaster. Lastly, the whole was finished up by hand-carving, so as to remove very much of that mechanical similarity and repetition of effect which the mould must give, as inevitably as do the printing-block and stencil now in vogue. It is a pity that all of our mechanically produced decorations are not finished with at least some few touches by the hand of an artist. No better example of the value of mechanical and hand work so combined can be found than the Alhambra wall-linings.



From the Dado in the "Hall of the Two Sisters."

But that is not the chief source of the beauty of Moorish work; it lies rather in the absolute obedience to the great principle of decorative art: That the *grace and movement* taught by living Nature, and not her actual objects, shall be wrought upon the lifeless material. The beauty of Nature's life seems to have been abstracted and bestowed upon this wood and plaster, as separate from the materialism of copyists as the perfume of Oriental attar is from the grosser matter of the rose. The Moor was by his religion forbidden to represent living things; he might not carve roses and birds in his ornaments, as doubtless he would have done, if this restriction had not been. He was denied exercising that imitative art which is with most races the preliminary stage. It would hardly have been surprising, therefore, if he had plodded on without ornament, beyond a few slowly developed constructional forms; but the instinct of decoration, the feeling for, and yearning after luxuriant beauty was too strong in these people to be so easily suppressed; while their talent for constructive design, that ability to evolve beautiful forms by the study of fitness which the Greeks possessed, was wanting in the Moors. Geometry was employed, and as we have seen, a most ingenious system of straight-lined ornament was developed. A lavish use of the graceful Arabic characters (forms derived from the reed pen used) in inscriptions, gave some of the necessary curved detail, and suggested certain conventional forms to satisfy this want more fully. And then came the most beautiful development: leaves might not be copied, but they might be studied, and an ornament designed which grew and moved as the leaves did; obeying the laws of growth not of one particular example, but of Nature generally. It is very extraordinary how exactly these designs comply with the theoretical conditions deduced from other styles. And it must be remembered that although the Arabian, and Turkish, and some others are kindred styles, yet each has its distinctive character, just as the European branches of the Renaissance have; and of all the Mohammedan styles the Hispano-Moresque is the purest in its ornament, as if the isolation had caused less influence to be felt from the old East, while there was no contamination from the North and West. Consequently the Moorish work illustrates the precepts of proper conventional art better than any other known style. There is a perfection of movement of curves in the way stems branch, and meet, and spread into leaves, always joining in tangential smoothness, reposeful because unstrained, yet vigorous in suggestion of growth and movement along the lines. Look at the ornament in the background of the inscription "There is no conqueror but God." The eye follows the lines without voluntary effort, without finding an uncomfortable angle or awkward joint to the end, where the leaf bends in graceful curves back upon itself, so that the motion is insensibly arrested. Then the veining or ribbing which makes up these leaves is just as harmonious though its dimensions are fractions of an inch. There is a systematic variation of the form in these small details, which is very like Nature's way of working, and each rib leaves the parent stem with a grace as carefully studied as is found in larger parts. All these details are subordinated, according to their situations, to a general plan, wherein main divisions differently treated afford contrasts of texture at distances where the detail is not discernible. There is the perfection of balance in proportion of straight and curved lines, and great appreciation of their expressiveness. Notice for example the transitions from the base of the wall upward in the "Hall of the Two Sisters." The dado does not contain a single curved line, only suggestions of curves in the radiating colors; straight lines of strength and rigidity ornament this substructure. Above it, still with much rectilinear design, some curves are introduced; and the inscriptions, less flowing than the leaf ornament, but more so than that of the dado, lead up to the curvilinear work upon the walls. Higher up the curves become more prominent, until in the roof they predominate in leading lines, and so the whole has that delightful appearance of each part belonging to its place.

Moorish ornament is an abstract of the art. Beauty apart from symbolism, from story, from passion, all of which contribute to the interest of many other styles; simply beauty for its own sake, reasoned out of Nature's workings. And as such it is worthy the deepest study, even by those who have no desire to imitate its particular methods. It is a grammar of the language of floral nature.

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[1] *Arteson*—1. A round kitchen trough for dishes, etc. 2. Ceiling carved in the shape of a trough.
Artesonado—Shaped in the form of a trough: applied to ceilings.—*Velazquez.*

AMERICAN SOCIETY OF CIVIL ENGINEERS.

CRANES. — THE SHUBENACADIE CANAL.

DORMER. CHATEAU DE FLEURIGNY. FRANCE.

AT a meeting of the Society held October 18, 1883, a paper by Mr. C. J. Appleby, Member Institution of Civil Engineers of England, on the subject of cranes as labor-saving machines was read by the author, who remarked that a well-constructed crane or other similar power machine, requiring only one man to drive it, would do as much work as could be done by the manual power of ten men, but in one-tenth of the time they would require. It seems singular that railroad and water-side depots and workshops should so rarely be laid out with reference to the employment of such labor-saving machines. The most economical working result is obtained from machines so arranged that when they take hold of the load, it is not released until final deposit. The author considered the following systems for transmitting or applying power :—

1. The well-known hydraulic system, with pressure-pumps, accumulator, and distributing pipes.
2. Compressed air distributed through pipes.
3. Steam distributed as above.
4. High-speed rope, or "endless cotton cord," which runs at a speed of 5,000 to 6,000 feet per minute.
5. Low-speed rope, running 1,500 to 2,000 feet per minute.
6. Square shaft supported on tumbler-bearings.
7. Steam from a boiler delivered on the top of a piston, with multiplying chains similar to the hydraulic system.
8. Boiler and engine fixed on the crane, and driving-gear for the several motions required.

The first, second and third can only be applied to cranes fixed or moving over very limited areas. The fourth, fifth and sixth will transmit power over large areas, which, however, should be nearly rectangular. The other two can be used generally wherever there is a railway track. The hydraulic system possesses great advantages over compressed air or steam, but experience tends to the conclusion that its common use will be attended with considerable inconvenience where the winters are cold. The use of compressed air has not been applied with great success in many cases.

Steam is largely used, and frequently carried through 1,000 feet of pipe without much inconvenience. The high-speed cotton cord, running at a speed of 5,000 to 6,000 feet per minute, works in grooved pulleys, is carried on rollers or other supports at intervals of ten to twenty-five feet, and is kept in tension by a weighted pulley. Low-speed rope transmission is generally effected by a hemp rope running from 1,500 to 2,000 feet per minute. The square shaft has been used for many years, the only special difficulty experienced being that of supporting the long main line of driving shaft. The author exhibited recent designs whereby this difficulty has been very successfully overcome. The relative advantage of rope or shaft transmission is largely influenced by local circumstances. As a general rule, the rope system costs less and is better where the distance for transmitting exceeds 200 feet. Below that distance the shaft is probably the best and cheapest. But the rope possesses advantages when machinery has to be driven at different levels, or at an angle with the point from which the power is transmitted.

The steam crane, employed under many differing conditions, perhaps performs more functions than any other mechanical arrangement for lifting and placing loads. All such cranes should lift and turn around by steam power. One specially illustrated has additional motions for altering the radius of the jib, for hauling materials so as to bring them within the reach of the machine, and also for moving empty or loaded cars. Fixed cranes are often seen so placed that one-third or even one-half of the number erected at a particular point are idle. It would therefore seem that, for the same outlay, the best performance will be obtained from movable cranes.

Where two or more railroad tracks are parallel with the water-front, it will often be desirable to make the crane span the two lines of tracks, allowing head-room for the vehicles to pass under it. Cranes fixed on floating vessels were also illustrated up to 60 tons power. Locomotive cranes up to 25 tons were described, and also cranes specially adapted to terminal freight stations. One of these has lifted 80 tons per hour a height of twenty to thirty feet, and deposited the loads of 1½ to 2 tons each 60 feet from the point where taken up. A similar crane commonly delivers 240 barrels of oil per hour the same height of lift and length of deposit. The cost per day is one driver's wages and the necessary fuel, oil, etc. Five per cent per annum is ample allowance for depreciation. The cost of this system of working is easily ascertained, but a great gain also arises from the increased speed of passing large quantities of merchandise.

A paper by E. H. Keating, Member American Society of Civil Engineers, upon the "Shubenacadie Canal," was read at the meeting of the Society held November 21. This canal lies between the City of Halifax, Nova Scotia, and the Basin of Minas, an arm of the Bay of Fundy. It was commenced in 1826, and the intention was to build it so as to accommodate vessels drawing eight feet of water, with the idea that at comparatively small additional expense it could be used by vessels drawing eleven feet. It was to have fifteen locks 87 feet in length and 22 feet 6 inches in width, with a lockage of 95 feet 10 inches, ascending from Halifax, and of 95 feet 4 inches descending to the Bay of Fundy. The total length is about 54 miles, the greater portion of which was to be in the Shubenacadie River, and in a chain of lakes existing along the line of the canal.

Mr. Thomas Telford, the celebrated engineer, made a very favorable report upon the proposed canal and its prospects. Up to the close of 1831, £72,000 had been expended upon the work, which was, however, in an entirely uncompleted state. Some of the locks near Halifax had not been commenced, and large and expensive work remained to be done upon the line of the canal. All the available capital being exhausted, the works were abandoned and fell into ruin, never having been completed on the original plan. In 1856 a report was made by Mr. W. H. Talcott, C. E., upon a scheme for completing the works upon a very much smaller scale than at first proposed, substituting for certain of the locks an inclined plane near Halifax, with a lift of 55 feet, and a similar plane with a lift of 33 feet at another point; the planes to be worked by hydraulic machinery. This report was adopted, and the work was completed in 1862, at a cost of $200,000. The diminished canal has, however, proved a failure as a commercial enterprise, and since 1870 no trade of any account has been carried on through it.

There was also presented a description, by Charles C. Smith, Member American Society of Civil Engineers, of an hydraulic canal built at Minneapolis, Minn., during the severely cold winter of 1881. This canal is under Main Street, Minneapolis, its entrance being at right angles to the street. It is covered with a semi-circular rubble-stone arch of 17 feet 6 inches span, and where the line turns the angle of 90°, the abutments of the arch were built on curved lines of the radius of 31 feet 3 inches and 48 feet 9 inches. The arch was built of rubble masonry, of stone varying from 4 to 6 inches thick, and from 18 to 36 inches long, the joints at the soffit being slightly hammered off, to approximately form beds conforming to the radial lines of the arch. The mortar was made of one part Louisville cement to two parts of sand, and was mixed in hot water without salt. During its construction the weather was extremely cold, the frost having penetrated the ground to the depth of six feet. An examination of this work having been made quite recently, it was found to be perfectly sound and free from any indication of settlement or rupture two years after its construction.

A discussion followed by the members present, more particularly in reference to the best methods of laying masonry in very cold weather, the experience of a number of members being favorable to the use of a strong solution of salt in the water with which the mortar was made.

THE ILLUSTRATIONS.

GLORIA DEI CHURCH, PALENVILLE, N. Y. MR. W. H. DAY, ARCHITECT.

THIS church is built of Catskill Mountain bluestone, found in the neighborhood. It is 28′ x 50′ outside, and is calculated to seat one hundred and thirty-five people. Walls (side walls) thirteen feet high and two feet thick.

CAPITALS FROM THE ALHAMBRA, GRANADA, SPAIN. DRAWN BY R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

SEE article on "Spanish Architecture."

WESTERN PENNSYLVANIA INSTITUTION FOR THE INSTRUCTION OF THE DEAF AND DUMB. MR. JAMES T. STEEN, ARCHITECT, PITTSBURGH, PA.

THE building is being constructed with basement of rock-face sandstone; the superstructure is of brick, faced with selected brick laid in red mortar, and is roofed with Pennsylvania slate.

BUILDING FOR C. O. MILLER, ESQ., STAMFORD, CONN. MR. WARREN R. BRIGGS, ARCHITECT, BRIDGEPORT, CONN.

THE building is constructed with pressed-brick front and terra-cotta finish; inside finish of ash. It has a frontage of thirty-seven feet and a depth of one hundred and twenty-two feet. Offices on second story, and large hall on third. It is heated throughout by steam. Cost of building complete, $25,000.

IRRIGATION IN INDIA. — The system of irrigation now in use in the Madras Presidency is on a vast scale, a record, though imperfect, of the tanks in fourteen cultivated districts showing them to amount to 43,000 in repair and 10,000 out of repair, or 53,000 in all. The length of embankment required for each may be estimated on a moderate calculation at half a mile, and the number of masonry works in irrigation-sluices, waste-weirs, and the like may be taken to be at least six. The embankments alone for all these tanks would extend over 30,000 miles, while the total number of separate masonry works are at least 300,000. The most remarkable feature about this gigantic system is that it is entirely of native origin, not one new tank having been made by Europeans; and, according to all accounts, there must be a good many equally fine works which have been allowed to fall into decay. According to the *Tropical Agriculturist*, the revenue dependent on existing works is roughly estimated at one hundred and fifty lacs.

SANITARY PLUMBING.[1]—XI.

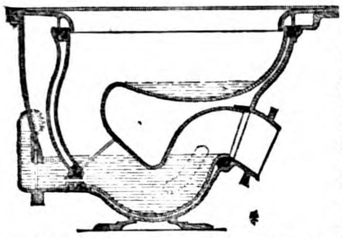

Fig. 27.—Section.—"Wash-out" Closet with Anti-siphon Supply-pipe.

FIGURES 27 and 28 represent an improved "wash-out" closet, showing the manner in which any closet may be so made as to be self-sealing, and any ordinary supply-pipe with which it may be connected converted into our anti-siphon pipe. Instead of having the bend which carries the mouth of the "inverted bottle" below the normal water-line of the trap, in the supply-pipe, it is here again, as in our "self-sealing" closet, made in the casting of the closet, so that the plumber has only a single connection to make for the supply, and is neither obliged to wrestle with subtle laws of hydrostatics, nor to carry about with him a skilled hydraulic engineer as helper.

The bowl and trap are constructed of glass, and framed in iron. The interspace is filled with plaster-of-Paris and putty. The manner in which the supply-pipe is connected is clearly shown in the drawing, and requires no further explanation. In order to prevent the flushing streams from twirling the lighter waste matters about in the bowl before ejecting them into the drain, the upper flushing-rim has a peculiar construction which causes the water to flow from all parts of it in a direction towards the outflow, and also provides that the largest volume of the water shall enter at the end opposite the outflow, and sweep across the bowl in a line parallel with its axis. This is done by simply constructing the flushing-rim in a separate piece from the bowl proper, and providing it with a partition, dipping into a groove filled with mastic, which causes the water to flow from the inlet, as shown by the arrows, first to the end of the bowl opposite the outflow, and thence into the inner flushing-rim, from which it flows in a direction always towards the outflow. The details of the construction are rendered sufficiently clear by the drawings. The longer axis of the bowl is preferably made at right angles with the water-way, inasmuch as this arrangement is the most convenient for use with the seat, or as a urinal.

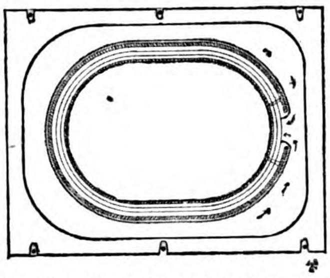

Fig. 28.—Plan of improved "Wash-out" Closet.

Although this form of "wash-out" closet does away with many of the objections of its class, it cannot be recommended because of its noisiness. Moreover, it is in many respects inferior to the "self-sealing" closet under consideration.

When the writer suggested this treatment of the supply-pipe as an "inverted bottle" to one of the leading plumbers of the city, this sanitarian attempted to dissuade him from undertaking the experiments to investigate it, saying, that while it was well known that water could be sustained in a pipe by atmospheric pressure for a certain length of time, say for a few hours, or possibly days, varying perhaps with the hygrometric condition of the atmosphere, yet it could not be depended upon for any greater length of time, as air or gas would surely make its way through the water and ultimately cause it to fall from the pipe. The experiments were nevertheless made, and it has been found that no variations of barometric pressure, nor any gaseous or aeriform emanations from the sewers or water-surface have, during the eighteen months at least of our experience with it, been able so to cure Nature of her abomination for the vacuum as to induce her to release this column of water in our supply-pipe.

(*c* and *d*) The effect of the combined action of the upper and lower jets is to fill the outlet-pipe of the trap for a moment full bore, which, of course, produces the maximum of *scouring* effect on the trap and soil-pipe. It also partially siphons out the water in the water-closet bowl. The loss is supplied, however, by the gradual return of the water which had risen to the upper edge of the bowl, through the small holes of the upper flushing-rose, and the water is raised again to its normal level without drawing on the supply standing for the purpose in the inverted bottle. The water rises to the rim much more rapidly than it falls from it, because in its passage upwards through the rose it is under pressure, but in its return it is not. It is this retardation by the rose-nozzle of the return of the water which enables it to restore the loss; since it gives time for air to break the siphon before the water arrives.

(*e*) The noise of the powerful flushing streams has been smothered in the manner described. No machinery exists in the closet to rust and creak, or to hammer in operation. No air-pipe is used to hiss and whistle when the flushing is finished.

A simple, slow-closing, noiseless valve is employed to regulate the flow of the water, as will hereafter be described; and in short, the closet may be used in becoming secrecy as is agreeable to civilized people, and without the usual flourish of trumpets which so ridiculously proclaims the fact to the household, whenever any one has sought a moment of special privacy.

(*f*) The flushing is effected by the simple pulling of the valve-cord, a long lever being all that is necessary to enable the heavy column of water below and above the valve to be lifted with perfect ease.

(*g*) A special supply-cistern is preferably used with this closet to avoid possible contamination of the water in the mains. The danger of a direct supply for all closets is now recognized by sanitarians, and legislation has rightly begun to provide against it.

(*h*) The manner in which the flushing streams are operated and directed renders spattering evidently impossible.

(*i*) The whole of the water used in flushing being used to the best possible advantage in ejecting the wastes, it is evident that the quantity required is at a minimum.

(*j*) The regulation of the quantity used for each flushing is chiefly the function of the supply-valve, and as such will be considered in detail hereafter; but the immediate response of the column of water in the supply-pipe to the action of the valve, renders the regulation more accurate and positive, and in so far it is due to the form of the closet proper.

The Form.

Of the form and material of this closet, enough has already been said to show with the aid of the drawings that they conform in every particular with the desiderata given under these heads, in our original table of requirements for an ideal water-closet.

The interior surface of the bowl and trap have been reduced to a minimum, by making each form part of the other, so that practically the water-closet consists of a trap alone, enlarged at one end, but otherwise having the simplest form that is possible with a trap. Hence there is no superfluous surface, corner, or angle, and none which does not receive the full and direct scouring of the flushing stream.

The standing water in the bowl measures 8½″ x 10½″, and as the glass is blown in an iron mould, the form which gives this surface will be as unvarying as the iron of which the mould is made. The glass for this bowl is blown in such a manner that the variations in thickness at this point are practically inappreciable.

The whole of the interior of the bowl, and more than half of the trap, including its lowest part, may be seen from above. The rest of the trap is made of clear, transparent glass, and the iron frame cast with large openings or windows on each side of this part of the trap, so that the entire surface both of bowl and trap may be inspected from without.

Glass, of which the bowl is made, is found in practice to be a far better material for the purpose than any other now known. The surface cannot craze or discolor. When opal glass is used for the bowl, the appearance is the same as that of the finest white porcelain; but glass of any desired color may be used instead of the white glass.

The frame is of cast-iron, which may be painted, enamelled, lacquered, galvanized, or treated in any way the taste may dictate; or it may be cast in solid brass, which may be polished, gilded, nickel or silver plated. The cost of brass for the frame would add ten or fifteen dollars to the cost of the closet.

The Construction.

(*a*) The bowl and trap are formed of two pieces of glass embedded in water-proof cement in the iron frame, so that they become with the frame, when the cement has hardened, practically a single piece. A tough cement is used, which is water-proof, and, after a few weeks, becomes harder than sandstone. The connection between the bowl and trap piece is made beyond the line of vision from the top of the bowl, as shown in section by the dotted line.

(*b*) As already described, the "inverted bottle" supply-pipe immediately restores any water which may be drawn from the trap by siphonic action or otherwise. The upper opening of the upper rose-nozzle governs the level below which the fall of the water opens the mouth of the bottle, and, by admitting a small quantity of air, allows a corresponding amount of water to flow slowly into the bowl. This upper opening is therefore placed very near the dip of the trap, say, three-quarters of an inch, so that should the water in the trap be suddenly lowered by siphonic action until the siphon were broken by air passing under the dip, the supply-pipe will afterwards gradually deliver to the trap enough water to restore a seal of three-quarters of an inch, and no more. The amount is limited in order to economize the water in the pipe and make it last as long as possible. Thus two disks of water four inches in diameter and less than three-quarters of an inch thick would be drawn from the supply-pipe every time a siphonic action was created powerful enough to lower the water in the trap to its lowest possible point before the siphon was broken by the entrance of air. The contents, therefore, of a four-inch supply-pipe seven feet high would restore a seal three-quarters of an inch deep to a trap so acted upon at least seventy-five times before the supply-pipe required refilling by usage of the closet. Now, when we consider how rarely it happens that the seal of a water-closet is thus broken by siphonage, and that the supply-pipe may be indefinitely increased in its capacity, or proportioned to conform to the influences affecting it, it is evident that this closet becomes practically *anti-siphonic*. We have assumed in our calculation that part of the water in the outer limb of the trap falls back as soon as the air breaks the siphon.

(*c*) The iron frame is constructed in a single piece from the top of the bowl to the connection of the trap with the soil or waste pipe. There is therefore no joint above this connection for a possible leakage. The glass within is so firmly and extensively embedded in

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[1] Continued from page 248, No. 413.

water-proof mastic that the escape of water into the space between the glass and metal is impossible. Even were it possible, it could do no damage, because it could neither extend nor escape at any other point than that of its entrance. The manner in which the iron frame is formed and connected with the supply and waste pipes is so clearly shown by the drawings that no further description is necessary. The labor of the plumber in setting is reduced to a minimum, and the closet may be taken apart and replaced at any time, as easily as the wooden casing of an ordinary closet can be unscrewed. It becomes practically a "portable" closet, and may be put up or taken down like a piece of furniture. A screw-driver and wrench are all that is necessary to connect or disconnect it, and the joints thus made are tight and strong enough to stand a steam pressure of a hundred pounds to an inch.

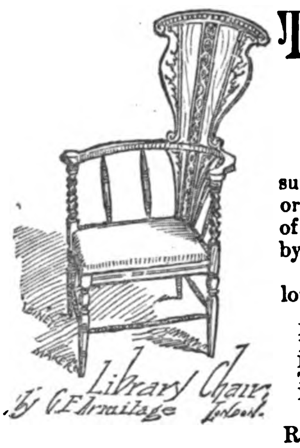
(*g*) Inasmuch as the water for the upper flush never rises above the edge of the glass bowl, the space above this, and below the portable flushing-rim may be made to serve as a ventilating-pipe. By connecting this space with a proper flue, the seat and bowl of the closet may be ventilated. Such ventilation is serviceable at the moment of usage of the closet; but is not needed for the bowl and trap themselves, which are kept odorless by their construction and arrangements for flushing. It is well, however, always to ventilate toilet-rooms, to remove the vapor and gases generated during their use by the occupant, and by the illumination, and as good a place as any to locate the ventilating outlet is under the seat of the water-closet as described. It is to be recommended that the gas-burner of the room be encased in a glass lantern connected above with the ventilating-flue, and below, both with the outlet-pipe already described, and with an additional ventilating opening or register placed somewhere as near the floor as possible, so that, when the cover of the water-closet is closed, the ventilating current shall not be arrested. This outlet-pipe may at the same time receive the cistern overflow-pipe, if desired; the end extends over the edge of the glass bowl, so that a leakage of the cistern-valve will be detected. Or the cistern-overflow may be connected with other overflow-pipes in the house and be carried to some open sink-bowl, or bath-tub, where escape of water will at once be seen.

To facilitate the emptying of the closet for disuse during winter, a small faucet is provided at the bottom which empties every part of the closet-bowl trap and supply-pipe. It may be connected with the soil-pipe, if desired, by a quarter-inch pipe which is connected with the faucet by a brass coupling.

The cost of the materials used in this closet is undeniably greater than in other hoppers; but this is offset by the saving in manufacture and repair. The expense involved in baking and glazing large pieces of earthenware is saved, and the money actually invested is returned in valuable and serviceable materials, not found in the others, which strengthen and protect the closet, so that no after expense is required to keep it in repair.

The appearance has been considered worthy of some attention in the design, in order that, now that it is customary to dispense with the wooden casing to ensure cleanliness and ventilation, the casing of iron, simple and appropriate in design, might in a measure fill its place. Thus in saving the expense of the panelled wood-work, we do not necessarily expose a fixture so offensive to the sight as to serve as a perpetual plea for a return to the old fashion of concealment.

A Tornado-Proof House.— A house built to withstand tornadoes— so the *Minnesota Tribune* says — is that of a banker, the wealthiest man in Osakis, Minn. All the corners are acute angles, and the sides sink back into other angles, giving this architectural freak the contour of a star. From the highest point of the roof the gutters sink suddenly, making great depressions. This angularity was, it is said, inspired by the banker's wife, who lives in constant dread of storms. The corners were made very sharp to split tornadoes. The cellar walls are of unusual thickness, and the timbers of the structure are anchored in them, so that the house may not be blown down without taking up the foundations. All the weather-boarding is put on in oblique lines.



TRANSVERSE STRENGTH OF TIMBER.[1] — II.

SUMMARY OF THE TESTS.

The tests recorded may be divided into four classes: —

1° Spruce beams.
2° Framing joints.
3° Built-up beams.
4° Hard-pine beams.

I. *Spruce Beams.* — Before giving a summary of the tests made in this laboratory I will insert some of the moduli of rupture and moduli of elasticity given by different authorities.

Moduli of rupture are given as follows: —

	Maximum.	Minimum.	Mean.
Hatfield,	12996	7506	9900
Rankine,	12300	9900	11100
Laslett,	9707	7506	9045
Trautwine,			8100
Rodman,			6168

Hatfield's, Laslett's, Trautwine's and Rodman's figures are from their own experiments. Trautwine advises, for practical use, to deduct one-third on account of knots and defects, hence to use 5400. The tables show the values obtained in these tests, and I will add a statement which I have already made in public, viz.: —

As a result of the tests thus far made in my laboratory it seems to me safe to say that, if our Boston lumber-yards are to be taken as a fair sample of the lumber-yards in the case of spruce, that if such lumber is ordered from a dealer of good repute, no selection being made except to discard that which is rotten or has holes in it, that 3000 pounds per square inch is all that could with any safety be used for a modulus of rupture, and even this might err in some cases in being too large; 2°, that if the lumber is carefully selected at any one lumber-yard, so as to take only the best of their stock, it would not be safe to use for modulus of rupture a number greater than 4000, and if we required a lot of spruce which should have a modulus of rupture of 5000 it would be necessary to select a very few pieces from each lumber-yard in the city.

SPRUCE BEAMS.

No. of test.	Width and depth.	Distance between supports.		Manner of loading.	Breaking load.	Modulus of rupture in pounds per square inch.	Modulus of elasticity in pounds per square inch.	Remarks.
	inches.	ft.	in.		pounds.			
3	2 × 12	15		Load at middle.	5894	5526	1237 215	
4	2 × 9	6	7.5	" " "	7322	5389	1067 893	
5	2 × 12	15		" " "	5586	5237		
5 a	2 × 12	7		" " "	8982			
6	2.75 × 9	6	8	" " "	7586	4082	938 453	
7	3 × 9	4		" " "	11086	3285		
8	3 × 9	10		" " "	6086	4508		
9	3 × 9	15		" " "	8086	5651		
10	3⅞ × 12	20		" " "	6586	4253		
11	2.5 × 13.5	10		" " "	9585	3787		
12	3.75 × 12	16		" 4.5′ from end	7585	3271		
14	7 × 2	7		" at middle.	1944	6748	....	Selected stock.
15	1.75 × 6.75	7		" " "	4785	7562	....	
16	3 × 9	6	8	" " "	9985	4931		
17	3 × 9	6	8	" at four points 16″ apart.	16744	4961		
18	3.9 × 12	16		" 4.5′ from end.	12585	5218		
19	2 × 12	14		Load at middle	4404	3854	1482 645	
20	2 × 12	14		" " "	5108	4469	1588 548	
21	3 15-16 × 12	14		" " "	8627	3834	1187 073	
22	3⅞ × 12	14		" " "	12545	5666	1332 715	
23	3⅞ × 12¼	14		" " "	6917	2995	897 961	
24	3 × 11⅞	14		" " "	8927	5442	1572 470	
25	2 × 9¾	14		" " "	3198	4139	1460 620	
26	2¾ × 12	14		" " "	6819	4339	1396 667	
27	1 15-16 × 10	14		" " "	4306	5601	1355 860	
28	4⅛ × 12	18		" " "	8829	4816	1397 136	
29	4 × 12¼	18		" " "	8324	4586	1259 224	
31	3⅛ × 12	18		" " "	7721	5559	1231 498	
35	6 × 12	18		" " "	11188	4196	1347 910	
36	2 × 11⅞	7	2	" " "	7870	3599		
37	4 × 11¾	12		" " "	10372	4135		
45	3⅞ × 11¾	16	4	" " "	8072	4436		
46	3 11-16 × 12	10	2	" " "	13772	4746		
49	3¾ × 11¾	14		" " "	12076	5878		
60	4 × 12	17	2	Distributed equally at 12 points.	26000	7448	1461 039	

34) 166247
Average modulus of rupture = 4889
17) 22214927
Average modulus of elasticity = 1306760

If numbers 14, 15 and 60 be omitted, which would seem fair to do, the average modulus of rupture would be 4596.

The modulus of elasticity (*i. e.* that determined from the immediate deflections) was: maximum, 1588548; minimum; 897961, mean, 1293-732.

The time test was made on yellow-pine, but if we should consider the effect of time on spruce the same as for yellow-pine we should obtain for use about 862488.

II. *Framing Joints.*— Perhaps the best course to pursue is to give simply the results of the tests.

As to conclusions to be drawn from them I can only say that framing weakens the timber very much, and causes it to split, and, therefore recommend very strongly the substitution of iron hangers.

Enough tests have not yet been made to deduce any rules from them, but the isolated tests exhibit the action of certain practical examples in common use.

It is also to be observed that the loads in the case of the headers were applied at the top, whereas in practice they are applied at the bottom of the holes. The latter arrangement was, however, obtained in the case of the floor, and in regard to this it is to be observed that the header already began to crack when the tail-beams broke, and hence that the floor could have borne but little more even if the load had been uniformly distributed.

In the following table I shall merely give a list of the tests made on

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[1] By Gaetano Lanza, Professor of Applied Mechanics, Massachusetts Institute of Technology. Continued from page 222, No. 411.

such framing, with the respective breaking weights, referring the reader to the records themselves for details.

No. of test.	Span.		Width and depth.	Description.	Breaking weights
	ft.	in.	inchs.		
1	6	8	2 × 12	Beam framed at both ends. Loaded at the middle.	6304
2	6	8	4 × 12	Header. Framed at ends. Mortised for four tail-beams. Loads applied above mortises.	10338
13	16		3¾ × 12	Trimmer. Mortised 4′ 6″ from one support. Load above mortise.	9085
38	6	8	6 × 12	Header. Framed at ends. Mortised for four tail-beams. Loads applied above mortises.	10798
39	6	8	6 × 12	Header. Hung in stirrup-irons. Mortised for four tail-beams. Loads applied above mortises.	21298
40	17	10	3 × 12	Tail-beam. Framed at one end. Loaded at the middle.	8171
41	6	8	3½ × 12	Header. Framed at ends. Mortised for four tail-beams. Loads applied above mortises.	10757
52				Floor-header and three tail-beams mortised into it. Loads applied at middle of tail-beams.	11238

III. *Built-up Beams.*— These were three in number, and were all of spruce. I will confine myself to a list, referring to the tables for details.

No.	Description.	Span.		Width and depth of cross-section.	Breaking load.
		ft.	in.	inches.	pounds.
42	Scarfed beam, bolted..........	16		6 × 12	15070
43	Keyed beam, bolted...........	15	6	6 × 12	15674
44	Sheathed beam................	15	6	6 × 12	11984

IV. *Yellow-Pine Beams.*— The moduli of rupture in common use are given as follows by different authorities, viz.: —

	Maximum.	Minimum.	Mean.
Hatfield,	21168	9000	15300
Laslett,	14162	10044	12254
Trautwine,		Yellow-pine	9000
		Pitch-pine	9900
Rodman,	9876	8796	9293
Stetson & Moseley's book,			11676

A summary of the figures obtained from these tests will be given in a table at the end of these remarks.

It will be observed that we have for

	Maximum.	Minimum.	Mean.
Modulus of rupture,	9380	4764	6984
Modulus of elasticity,	2386096	1256286	1779517

We also have a considerable reduction of the modulus of elasticity with time, as shown by the time test, the immediate modulus of elasticity being 1721605, of which two-thirds is 1147737, this value being reached with a load somewhat less than 8000 pounds.

YELLOW-PINE BEAMS.

No. of test.	Width and depth.	Span.		Manner of loading.	Breaking weight in pounds.	Modulus of rupture.	Modulus of elasticity.
	inches.	ft.	in.				
30	3 × 13⅞	14		Load at centre.	15158	6614	1937025
32	4 1-16 × 12 3-16	18		" " "	13751	7383	1733976
33	3 15-16 × 12¼	18		" " "	9832	5386	1793923
47	3 × 13¾	14		" " "	19574	8696	2386096
50	4 × 14 1-16	21		" " "	12875	5914	1256286
53	3⅛ × 14	24	6	" " "	10076	7206	1784426
54	3 × 12⅛	24		" " "	9576	9380	2116821
56	3⅛ × 14	15	4	" " "	10572	4764	1490396
57	2 15-16 × 12	19	2	" " "	8472	6950	1444521
59	9 × 13¾	24		" " "	21083	5352	1417793
62	4⅛ × 12⅛	19	10	" " "	15461.	9102	2037939
63	4 3-16 × 12 3-16	20		" " "	14073	8145	1599339
64	4⅛ × 12¼	19	10	" " "	10573	6098	1917976
65	4 × 12¼	19	8	" " "	11573	6782	1966717

14) 24913237

Average modulus of elasticity = ... 1779517

14) 97772

Average modulus of rupture = 6984

Besides those above enumerated there are: —

No. 34, the time test.

No. 58, a beam with an iron flitch, and

No. 61, a beam with iron straps.

Each of which is a special case, and can be found in the records.

Also, on oak beams we have the three following tests: —

OAK BEAMS.

No. of test.	Span.		Width and depth.	Description.	Breaking weight in pounds.	Modulus of rupture.	Modulus of elasticity.
	ft.	in.	inches.				
48	19	6	6 × 12	Load at middle.	13776	5596	1766839
51	15	6	4¼ × 14⅜	" " "	19076	6060	1240728
55	13	8	3 × 13¼	" " "	10671	4984	853098

MODERN BLASTING AGENTS.

FOR many years the only explosive agent at command was gunpowder, and often the process of blasting was slow and unsatisfactory, particularly in wet or very hard ground. In course of time chemistry found the means of blasting in the wettest ground and hardest rocks. Quite recently a number of explosives of a far more powerful character than gunpowder have been produced, some of which have found their way largely into practice for blasting purposes. The tendency of invention has been to produce an explosive of greater potential energy than gunpowder, and which shall be practically safe. The successful attempts in this direction can be counted on the fingers' ends: they relate mainly to nitro-compounds, of which gun-cotton, dynamite and lithofracteur are the chief.

Although gun-cotton and kindred explosive agents possess a wide sphere of usefulness, especially with regard to military purposes, they are not adapted to mining operations. The rigidity of gun-cotton and similar cartridges is a great disadvantage in charging the bore-hole, the charge being liable to stick fast, and this has, in fact, been the cause of accidents. The plastic nature of dynamite and lithofracteur, on the contrary, permits of the cartridge adapting itself to any irregularities that may occur in the bore-hole, and so the operation of charging is facilitated, and one great source of danger is absent. Hence the nitro-glycerine compounds are greatly preferred to those explosives which in their nature are rigid and incompressible. As a natural result, and seeing that the power of well-made standard dynamite—that is, dynamite containing 75 per cent of nitro-glycerine and 25 per cent of kieselguhr — is equal to that of pure compressed gun-cotton, dynamite, introduced first into England in 1867, has taken a firm stand as one of the most practically useful explosive agents for industrial purposes. According to Sir Frederick Abel, the sale of dynamite was eleven tons only in 1867. The demand, however, rapidly increased, and 5500 tons were sold in 1877 from Nobel's dynamite factories alone, whilst in 1882 the consumption reached 9500 tons; this, however, by no means represents the total amount of dynamite made and used.

Aut although possessing many advantages, dynamite has two slight drawbacks. In the first place it develops nitrous fumes after a shot has been fired, rendering close workings untenable for the time being. The development of these fumes is due to imperfect combustion of the nitro-glycerine, and the energy developed by the explosion of the main bulk of the charge so acts upon the unconsumed portion of the nitro-glycerine as to convert it into vapor, which mixes with the atmosphere, and, with the smoke from the fuse, hangs about the face of the work for a considerable time. This it is which causes the fumes which are detrimental to health, and which enforce idleness on the part of the miner while waiting for them to clear off. On the other hand, the use of lithofracteur is not accompanied by this disadvantage, for it does not develop any fumes by its explosion if properly used, as has been demonstrated by practical experience in its use. The reason of this is that, whilst lithofracteur contains a smaller percentage of nitro-glycerine than dynamite it also contains other ingredients, which, while acting as perfect absorbents, assist also in the explosion, and enable every atom of the nitro-glycerine to be exploded in the bore-hole, thus preventing any portion being projected into the air in the form of poisonous gas, the result of imperfect combustion.

The second drawback possessed by dynamite is that its action, being exceedingly rapid, is more or less locally intensified, producing a smashing, rather than a rending, effect on the rock. The rapidity of action is due to the fact that nitro-glycerine is the sole explosive, the development of the power due to its combustion being enormously rapid. Lithofracteur, on the other hand, consists of nitro-glycerine combined with a large additional percentage of other combustible and explosive absorbent media, and but a small proportion only of incombustible matter. The result is that the action and reaction of the ingredients of lithofracteur are so nicely balanced as to cause a retardation of the explosion. In other words, it is slower burning than nitro-glycerine, just as large-grain gunpowder is slower burning than rifle-grain powder, although weight for weight they may both develop the same power, but with a different result. This retardation causes lithofracteur to act with greater rending effect than in the case of other nitro-glycerine compounds, which have a smashing action. With lithofracteur the rock is not merely crushed to powder within a limited area around the bore-hole, but it is rent and fissured—lifted, in fact — to a very wide extent, so that at each shot the miner gets much more ground. This has been proved by the use of lithofracteur, and the fact being recognized by practical men, it may be concluded that its merits only require to be better known for it to take its place with dynamite as a useful blasting agent.— *Iron.*

A QUESTION OF RECOVERING A CONTESTED FEE.

November 30, 1883.

To the Editors of the American Architect: —

Dear Sirs, — The *American Architect* for November 24, states as editorial opinion: "A proprietor who requests an architect to prepare plans, implies in that request a promise to pay him the customary compensation . . . and the architect has only to prove employment to recover," etc.

Will you kindly advise us of the decisions in England or America, on which your opinion is based, and if by "*prove employment*" you mean simply to show the *work was done*, or show proof *it was ordered done?* We have a case in suit at present, where *contract is denied*, as no written engagement accompanied instructions for the work; though the drawings are acknowledged to be as ordered, and no tender to return same, or declination of acceptance has been made.

Respectfully, X.

[In English practice see Ward *vs.* Lowndes, 1 E. and E., 940; 28 L. J., Q, B., 265; also Worthington *vs.* Holland, L. R., 1 Q. B., 63; 35 L. J., Q. B., etc.

We have no notes at hand of American cases, but think we can find some. In X.'s case the question whether the drawings were ordered or only volunteered seems to be the important one. Of course, the fact of their having been made is *prima facie* evidence that they were ordered, and as no written instrument is necessary to constitute a good contract for professional service it should require very strong testimony to prove that either an architect or his client supposed that such service was to be rendered gratuitously. The only testimony of this kind which is likely to be brought will be, we fancy, a citation of the example of some one of those pernicious individuals among the cheap variety of architects who "solicit the privilege of submitting sketches," without mentioning the disagreeable subject of remuneration, to the ruin of their own reputation, and the injury of all those who have the misfortune to be classed, in the directory, in the same profession with them. — Eds. American Architect.]

THE ATLANTA STATE-HOUSE COMPETITION.

November 21, 1883.

To the Editors of the American Architect: —

Gentlemen, — Some of your subscribers are noticing the fact that nothing has been mentioned editorially in regard to the Atlanta competition. There is a certain sophisticated look about the advertised invitation, but at the same time there is so much left in the hands of an unnamed commission that it might lead some people to suppose that there was to be no show of fairness. Can you offer any information or explanation of the situation other than your advertisement and the printed matter furnished by the Governor, all of which is very fine, but far from assuring; as, for instance, there is nothing to show that all the drawings may not be kept for months, to be "milked" by a local builder, and nobody awarded the prize. Also, can you explain what "a reasonable time" means?

Very respectfully yours, A. B. C.

[We regret to say that we are quite ignorant of the facts in regard to the Atlanta competition. A year or more ago we had occasion to notice an "invitation to architects" issued from that city, which seemed to indicate that "architects" were regarded there as beings perhaps a little superior to field laborers, but inferior to clay-eaters; and since that time have preferred to confine our attention to districts which give evidence of a greater regard for the fine arts, or at least for those who profess them. We should not think of imputing any unfair intention to the commission which, as our correspondent says, will have the matter of the new competition in charge, and, in fact, we think that such bodies generally conduct themselves, according to their light, with scrupulous integrity; but it is a good rule that men who wish to have their rights respected do best to look after them for themselves; and architects who have so much spare time on their hands as to be able to make designs for State-houses on speculation must expect to receive less consideration than their more independent brethren who insist on being paid for what they do. We can hardly offer any suggestions for protecting the interests of competing architects, other than the rather belated one of keeping their drawings safe in their hands until satisfactory assurance has been given as to the composition of the jury and methods of judging, with other important details. Except for the trouble and expense of tracing such large drawings, it might be worth while to copyright them by filing at Washington. This would prevent "local builders" or any one else from reproducing them or carrying them into execution without leave from the owners.

What "a reasonable time" means depends wholly on the circumstances of the case. As applied to the production of working-drawings for a building, a year would be little enough for the contract drawings of an important public structure, and details for execution should have as much more, even if it were possible to make them all before the commencement of the work, which it seldom is. — Eds. American Architect.]

STRAINS IN FRAMED STRUCTURES.

To the Editors of the American Architect: —

Dear Sirs,— I was much interested in your review in No. 412 of the *American Architect*, of Du Bois's "*Strains in Framed Structures.*" It is very desirable that all book-reviewers should use equal care and discrimination in preparing notices. Your review was mainly from the architect's standpoint; the following items gathered in a hasty examination of the book in connection with your review, are offered that your readers may have the benefit of a view from the engineer's standpoint. We agree with you that this volume is superior to any other on the subject, and call attention to the following, that "the defects may be corrected in the next edition."

On page 57 counter-braces are defined, and their supposed use in stiffening the truss explained. On page 342 camber is explained; the deflection is assumed to be due only to the chords. The author concludes an unnecessarily long analysis to find camber by saying, "but the formula gives less than is allowed in practice," and "it is well in practice to increase it, say, two inches." Roughly, the deflection due to the web is about three-eighths of that due to the chords. If counters were put in every panel, and screwed up to their full capacity—only about half of this amount, or less than one-fourth of the whole deflection can be retained. The "stiffness" obtained in ordinary cases by screwing up the counters is inappreciable.

One of the weak points in all treatises on stresses in bridges is the neglect of the effect of the wind. Although this volume is an improvement on its predecessors it is still deficient in this respect. No mention is made of even the approximate amount of surface exposed to the action of the wind by different type-forms of trusses, although a great deal of space is given to the consideration of "dead weight." Surface exposed and dead weight are analogous. The author should not have omitted (1), the distribution of wind-pressure between top and bottom chords; (2) the effect of the wind in throwing more than half the load upon the leeward truss; (3) the method of transferring the wind-pressure borne by the unsupported chord to the abutment.

It is to be regretted that the author did not give some of the reasons why the working stress is but a small part of the ultimate strength. It would not be lost on the rising generation of engineers, and perhaps it would remove the misapprehension of the non-professional in this matter.

In reference to the strength, etc., of different qualities of material, as bar, plate and shape iron, and also the effect of impact, the specifications at the end of the volume are superior to the text. The only item concerning the floor-system of a bridge is a drawing copied from the specifications of the Cincinnati Southern Railroad of the standard roadway on that line, and inserted at the very end of the book without a single word of comment. The width of a bridge is nowhere mentioned. I. O. B.

BOYLE'S INDIAN GROUP.

St. Paul, Minn., November 23, 1883.

To the Editors of the American Architect: —

Dear Sirs,—I was much interested in your illustration and mention of "Mr. Boyle's Indian Group for Lincoln Park, Chicago." You consider the "unity of the impression" not preserved in the position of the dog. On the contrary, this seems to me particularly well conceived, for the dog, while keeping close to his master and with one eye on the alert for the least sign from him, at the same time has the other eye intently fixed on the approaching stranger. The whole posture of the surly looking brute suggests distrust and ready defence, though not defiance.

I like the spirit shown in your answer to "G. G. G.," and am glad to see you improve every opportunity to show up architectural plagiarism in its true light.

Yours truly,
H. R. P. Hamilton.

NOTES AND CLIPPINGS.

Demonology and House-building. — House-building is an affair of so much spiritual importance and elaboration in Burmah and Siam that there are bulky treatises on the subject, containing minute instructions for the propitiation of all manner of demons.

The Present Nail Product.— *The Bulletin* of the Iron and Steel Association prints a list of the nail-works, and states that seventy-four now completed have 5,008 machines, and will add 391 more before the close of the year, while there are five new works being built which will have at least 200 more nail-machines in operation by January 1. By that time there will be 6,599 nail-machines ready to work, with a capacity of 12,376,000 kegs of cut nails and spikes yearly. The mills and machines now completed have a capacity of about 1,000,000 kegs less; about 3,264,000 in Pennsylvania, 2,200,000 in Ohio, 1,668,000 in West Virginia, 875,000 in Massachusetts, and 690,000 in New Jersey.

Apropos of the same subject the Philadelphia *Press* remarks: "The building boom has been for at least nine months past the chief support of the iron market; but there are many minor signs that it is near its end. The pause in the rise of rents on Manhattan Island last May was the first indication that building in New York City was overdone, and it has been followed by others which point to a serious check in real estate values there in the next six months. Nails, which since their tremendous jump in 1879-80 have been in steady demand, now show over-production. The capacity of the nail-works in the country, finished or unfinished, is 12,376,000 kegs, or twice the output in 1882, and this increase is launched on a failing market. In addition, various forms of iron used in building show a decided decrease in demand. Unless there is a sudden increase in railroad building, the falling off in house building must have a serious effect on the labor market before Spring."

The Thirsty Eucalyptus.—Where there is surplus moisture to dispose of, as, for example, a cesspool to keep dry, says the *Pacific Rural Press*, a large eucalyptus will accomplish not a little, and a group of them will dispose of a vast amount of house-sewage. But if you have water which you do not wish to exhaust, as in a good well, it would be wise to put the eucalyptus very far away. Daniel Sweet, of Bay Island farm, Alameda County, recently found a curious root formation of the eucalyptus in the bottom of his well, about sixteen feet below the surface. The trees to which the roots belonged stand fifty feet from the well. Two shoots pierced through the brick wall of the well, and, sending off millions of fibres, formed a dense mat that completely covered the bottom of the well. Most of these fibres are no larger than threads, and are so woven and intertwisted as to form a mat as impenetrable and strong as though regularly woven in a loom. The mat when first taken out of the well was water-soaked and covered with mud, and nearly all a man could lift, but when dry it was nearly as soft to touch as wool, and weighed only a few ounces This is a good illustration of how the eucalyptus absorbs moisture, its roots going so far to find water, pushing themselves through a brick wall, and then developing enormously after the water is reached. Mr. Sweet thinks one of the causes of the drying up of wells is the insatiable thirst of these vegetable monsters.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

288,977. Support for Swinging or Pendent Scaffolds. — James T. Churchill, St. Joseph, Mo.

288,980-981. Stay-Roller for Sliding-Doors. — William Cronk, Havana, N. Y.

288,984. Spring-Hinge. — Levi M. Devore, Freeport, Ill.

288,995. Steam-Radiator. — Samuel F. Gold, Englewood, N J.

289,003. Roof-Coating. — James H. Kelley, New York, N. Y.

289,005. Veneer. —Frederick Koskul, St. Louis, Mo.

289,022. Fire-proofing Composition. — John H. Nolan, Boston, Mass.

289,024. Brick-Kiln. — James W. Penfield, Willoughby, O.

289,031. Door-Lock. — John Schilling and Abram Albert Massar, Pomeroy, O.

289,045. Heating-Drum.—George W. Weamer and Franklin T. Zimmerman, Auburn, Ind.

289,048. Paint-Distributer. — John P. Whipple, Whitewater, Wis.

289,050. Fire-Escape.—John S. H. Willcox, Whitby, Ontario, Can.

289,052. Pliers. — Charles F. Winslow, Pawtucket, R. I.

289,056. Screw-Driver. — George S. Allen and Robert C. Ellrich, Southington, Conn.

289,061. Fire-Escape. — George Borst and Frederick Will, Rochester, N. Y.

289,068. Automatic Hatch, etc.— Cass Chapman, Chicago, Ill.

289,069. Wrench. — John H. Coes, Worcester, Mass.

289,076. Lightning-Conductor. — Thomas H. Dodge, Worcester, Mass.

289,080. Fire-Escape. — David L. Garver, Hart, Mich.

289,094. Shingle-Sawing Machine. — Oley C. Hanson, Eureka, Cal.

289,096. Machine for the Manufacture of Sky-light Bars, Window-Sash Bars and Mouldings. — George Hayes, New York, N. Y.

289,101. Fire-Escape. — Walter A. Holbrook, Milwaukee, Wis.

289,105. Building-Front. — Peter H. Jackson, San Francisco, Cal.

289,107-108. Sewer-Gate. — Samuel Johnson, San Francisco, Cal.

289,112. Artificial Stone for Veneers, Moulded Articles, etc. — Wilhelm Matt, New York, N. Y.

289,119. Fire-Escape. — John Metzger, New York, N. Y.

289,126. Expansion-Bit. — George Nichols, Seymour, Conn.

289,163. Fire-Escape. — Leo Straehl, Detroit, Mich.

289,170. Wood-Boring Machine. — Miles Sweet, Troy, N. Y.

289,174. Drip-Pan for Windows. — Winfield S. Taylor, Trenton, N. J.

289,176. Inside Blind. — Wm. Teuteberg, Omaha, Neb.

289,188. Pipe-Wrench. — Conrad D. Volkmann, Nappanee, Ind.

289,210. Water-Closet. —William Bishop, Brooklyn, N. Y.

289,218. Fire-proof Floor. — Andrew J. Campbell, New York, N. Y.

289,220. Fire-Escape. — Thomas T. Church, Port Hamilton, N. Y.

289,233. Hotel and Burglar-Alarm Electric Annunciator. — William S. Corwin, Newark, N. J.

289,259. Door-Check. — William H. Herrick, Grinnell, Iowa.

289,262. Fire-Proof Compound. — Karl A. Hohenstein, Brooklyn, N. Y.

289,286. Fire-Escape. — Bernard C. Margileth, Aurora, Ind.

289,287. Fire-proof Box for Fire-Escapes. — Bernard C. Margileth, Aurora, Ind.

289,304. Fire-Escape. — Peter P. Pealer, South Dansville, N. Y.

289,305. Knob-Attachment. — Edward L. Phipps, Milford, Mich.

289,318. Fire-Escape. — Thos. B. Smith, Baltimore, Md.

289,332. Joiner's Plane.—Henry B. Beach, Meriden, Conn.

289,333. Drive-Screw.—Thos. J. Bray, Pittsburgh, Pa.

289,347. Wrench. — James Houlehan, Toledo, O.

289,350. Safety-Guard for Elevators. — Wm. A. Ingalls, Providence, R. I.

SUMMARY OF THE WEEK.

Baltimore.

Dwelling and Stable. — Messrs. J. A. & W. T. Wilson, architects, have prepared drawings for A. G. Davis, Esq., for a three-st'y attic brick and Cheat River stone dwell., 50′ x 55′, on Eutaw Pl., cor. Lauren St., and a two-st'y brick and Cheat River stone stable, 47′ x 51′, its rear to cost, $50,000; John E. Marshall, builder.

Building Permits. — Since our last report ten permits have been granted, the more important of which are the following :—

George A. Blake, 2 three-st'y and mansard roof buildings, n s Biddle St., cor. Lovegrove Alley.

E. J. Cooper, three-st'y brick building, n s Harlem Ave., bet. Gilmor and Stricker Sts.

Jas.V. Pryor, 2 three-st'y brick buildings, n s Preston St., w of McKim St.

Asendorf & Dryer, three-st'y brick building, s e cor. Lombard and Concord Sts.

A. K. Robins, two-st'y brick building, s s John St., e of Wilcox Alley.

Wm. T. Phillips, 7 three-st'y brick buildings, n s Franklin St., com. n w cor. Vincent Alley; and a three-st'y brick building, w s Stricker St., n of Saratoga St.

Boston.

Building Permits. — *Wood.* — *Elmore St.*, near Erie Ave., Ward 4, for William Coady, 2 dwells., 20′ x 32′, two-st'y pitch; Wm. Coady, builder.

Centre St., opposite Church St., Ward 23, for Geo. F. Tillston, stable, 20′ x 40′, two-st'y pitch.

Bismark St., rear, near Boylston St., Ward 23, for Haffenreffer & Co., storage, 17′ x 34′, one-st'y flat; Haffenreffer & Co., builders.

Boylston Ave., near Boylston St., Ward 23, for J. M. Cutter, dwell., 22′ x 30′, three-st'y hip.

Mt. Vernon St., near Centre St., Ward 23, for Thos. O. Grady, Jr., dwell., 29′ and 32′ x 36′, two-st'y pitch; Thomas O. Grady, builder.

Melville Ave., near Washington St., Ward 24, for B. B. Whittemore, dwell., 28′ 6″ x 32′ 6″; ell, 14′ x 21′ 6″, two-st'y pitch; H. P. Oakman, builder.

Athens St., *No.* 324, Ward 14, for Henry R. Stevens, dwell., 18′ x 26′, two-st'y pitch; Lewis Bros., builders.

Gallop's Island, East End, Ward 2, for City of Boston, quarantine building, 40′ x 100′, one-st'y flat; Josiah Shaw, builder.

Nonantum St., rear, near Newton Line, Ward 25, for J. J. White, dwell., 20′ x 20′, two-st'y mansard; stable, 20′ x 20′, two-st'y mansard; A. G. Tapper, builder.

Everett St., near Leaverus Ave., Ward 23, for B. F. Sturtevant, dwell., 39′ 4″ x 41′ 8″, two-st'y mansard.

Cottage St., cor. Iliad St., Ward 20, for Wm. Donaldson, dwell., 25′ and 28′ x 34′, two-st'y pitch; Wm. Donaldson, builder.

Commercial St., near Pleasant St., Ward 24, for Bridget Lally, dwell., 22′ x 30′ 6″, three-st'y flat; Hugh Smith, builder.

North Ave., *No.* 14, Ward 20, for Mrs. S. C. Rowell, dwell., 14′ x 16′ and 20′ x 30′, two-st'y pitch; Wm. Donaldson, builder.

Norfolk St., cor. Withington St., Ward 24, for Richard B. Hassett, dwell., 24′ x 53′, three-st'y flat; Mr. Rockwell, builder.

Brooklyn.

Theatre. — A meeting of representatives of the amateur dramatic societies of Brooklyn, interested in the plan to erect a new opera-house, was held lately, at No. 187 Montague St., with G. de Cordova in the chair. It was announced that $125,000 of the $250,000 necessary to purchase a site and erect the building had been subscribed.

Chicago.

Building Permits. — J. L. Campbell, 7 two-st'y dwells., cor. Campbell Ave. and Flournoy St.; cost, $16,000.

W. D. Kerfoot & Co., 7 one-st'y cottages, cor. Rice and Leavitt Sts.; cost, $9,000.

Newberry Estate, five-st'y factory, 153 to 159 Superior St.; cost. $40,000.

U. P. Smith, 2 two-st'y dwells., 3247 and 3249 Groveland Park Ave.; cost, $11,000.

Anthony Kane, five-st'y warehouse, 212 Michigan St.; cost, $14,000.

William Burke, three-st'y store and dwell., 506 Ogden Ave.; cost, $5,000.

J. Jela, one-and-one-half-st'y cottage, 712 Holt Ave.; cost, $2,300.

E. Baumann, 2 two-st'y dwells., 531 and 533 Jackson St.; cost, $10,000.

M. Base, one-st'y dwell., 313 Henry St.; cost, $1,200.

Cincinnati.

House. — Miss M. Louise McLaughlin, the artist, is to build a new brick dwell. on Walnut Hills. The plans are being prepared by her brother, Mr. James W. McLaughlin, architect.

Building Permits.—F. Grammann, three-st'y brick dwell., State Ave., near Eighth St.; cost, $4,800.

Wilson & Co., additional story on store; cost, $8,000.

Enterprise Carriage Co., six-st'y brick factory, Court St., near Main St.; cost, $10,000.

John Griffith, two-st'y frame building, Lincoln Ave., near Orchard St.; cost, $5,000.

Jacob Elsas, five-st'y brick store, Pearl St., near Elm St.; cost, $6,000.

W. E. Stephens, 2 two-st'y frame dwells., Prichard St., near Willow St.; cost, $4,000.

B. Frickers, two-st'y brick building, State Ave.; cost, $4,000.

Adam Hoecke, two-st'y brick dwell.; cost, $4,000.

J. Straub, two-st'y frame dwell., Clifton Ave., cor. Warner St.; cost, $4,000.

Wilson Hinkle & Co., addition to store, Walnut St., near Baker St.; cost, $8,000.

Catholic church, on Price Ave.; cost, $6,500.

E. M. Spellmire, two-st'y frame building, Hawthorne Ave.; cost, $3,500.

E. A. Snyder & Co., five-st'y brick factory, cor. Smith and Augusta Sts.; cost, $10,000.

Ten permits for repairs; cost, $5,500.

Total permits to date, 750.

Total cost to date, $2,613,250.

Minneapolis, Minn.

Houses.—Charles Robedeau is building a $4,000 house in Yale's addition.

Kees & Fisk are preparing plans for a house for Charles Sparks, in Calhoun Park.

Dr. Simpson is building a $3,500 house on Sixth St.

J. Haley is preparing plans for a $3,000 house for Mr. Rohann, on Hennepin Ave.

S. W. Van Dompsellar is the contractor for a $4,000 house now being built for John Fleetham, cor. Second St. and Tenth Ave.

Tenements. — C. P. Moses is building a $10,000 three-st'y brick block of four tenements, cor. Hawthorne Ave. and Fifteeenth St.

Orff Bros. are the architects of a $5,000 double tenement for Frank S. McDonald, on Eighth St.

J. A. Spear is building a brick veneered block of eight tenements on Fourteenth Ave., s e cor. Fifth St. The cost will be from $20,000 to $25,000.

New York.

Apartment-Houses. — On the s e cor. of Sixty-second St. and Boulevard, it is proposed to have built a ten-st'y apartment-house, to cost $325,000: Messrs. McClay & Davis own the land.

Mr. E. H. M. Just proposes to build 7 five-st'y brick and stone flats on the e s of Eighth Ave., between One Hundred and Thirty-fourth and One Hundred and Thirty-fifth Sts., from designs of Mr. Mortimer C. Merritt; cost, $140,000.

For Mr. D. W. Slocum, 2 five-st'y flats, 25′ x 55′, are to be built at Nos. 407 and 409 West Forty-ninth St., from designs of Mr. Robert Mook.

For Mr. George Ehret, 2 five-st'y flats are to be built on the s s of Thirty-ninth St., 65′ w of First Ave., 30′ x 61′ each, from designs of Messrs. H. J. Schwarzmann & Co.

Mr. Peter McManus will build 3 five-st'y brick and stone flats on the s w cor. of Avenue A and Fifty-eighth St.: cost, $50,000.

For Mr. Thos. Maloney, a five-st'y flat house, 25′ x 60′, is to be built at No. 349 East Seventieth St., from designs of Mr. R. W. Buckley.

For Mr. F. S. Schnugg, a five-st'y flat with store below, 25′ 6″ x 75′, is to be built from designs of Mr. Julius Kastner.

Stores. — On the e s of Greene St., between Houston and Greene Sts., 3 five-st'y brick stores, 38′ x 95′ each, with iron fronts, are to be built by Messrs. Schoolherr & Goldenberg, at a cost of about $175,000.

Building Permits. — *One Hundred and Twentieth St.*, s s, 90′ w Lexington Ave., 4 five-st'y brick tenements, tin roofs; cost, each, $18,000; owner, Patrick Dempsey, 5 East One Hundred and Thirty-second St.; architects, Cleverdon & Putzel.

West Forty-second St., *No.* 327, five-st'y brick flat, tin roof; cost, $25,000; owner, Samuel McMillan, 245 West Forty-second St.; architects, Thom & Wilson.

Eleventh Ave., *Nos.* 479 *and* 481, one-st'y brick workshop, gravel roof; cost, $2,000; owner, Albert Smith, 445 Eleventh Ave.; architect, Jas. Codey; builder, Mr. Buckley.

Fifty-seventh St., s s, 210′ e Third Ave., 2 five-st'y brick tenements, tin roofs; cost, each, $18,000; owners, Kunkell & Stauffer, 58 East Forty-first St.

East Eighty-first St., *No.* 224, five-st'y brick tenement, tin roof; cost, $17,500; owner, Peter Seebald, 232 East Eighty-third St.; architect, John Brandt.

Sixty-seventh St., n s, 125′ e Fourth Ave., 4 five-st'y brick flats, tin roofs; cost, each, $25,000; owners, Wall & Weyer, 110 East One Hundred and Twenty-fifth St.; architect, R. Rosenstock; built by day's work.

Seventy-seventh St., n s, 94′ e First Ave., 3 five-st'y brick tenements, tin roofs; cost, each, $16,500; owner and architect, same as last.

Alterations. — *Third Ave.*, *Nos.* 1042 *and* 1044, one-st'y brick extension, etc.; cost, $5,000; owner, Hannah C. Gerry, by E. T. Gerry, 8 East Twenty-eighth St.; architect, B. McGurck; builder, Thos. Brennan.

Tenth Ave., *Nos.* 22, 24 *and* 26, raise one-st'y; cost, $18,000; owner, Strauch Bros., 16 Gansevoort St.; architect, Wm. Howe; builder, Jacob J. Banta.

Philadelphia.

Theatre. — Col. J. A. Haverly is to build a theatre here in addition to the larger one he proposes to build in New York.

Building Permits. — *South Eleventh St.*, *No.* 710, one-st'y stable, 15′ x 28′; W. H. Miller, owner.

Castle Ave., cor. Broad St., addition to church, 16′ x 43′; Thos. Gamon, contractor.

Clearfield St., n s, w of Jasper St.. two-st'y dye-house, 32′ x 60′; Dickson Bros., contractors.

Hancock St., e s, n of Columbia Ave., two-st'y engine and boiler-house, 36′ x 40′; J. Mander, contractor.

Mervine St., *No.* 1435, two-st'y stable, 38′ x 44′; J. Wilson & Sons, contractors.

Walnut St., *No.* 2039, fourth-st'y addition to brick building, 16′ x 55′ J. W. Howard & Co., contractors.

Wheat Sheaf Lane, cor. Richmond St., two-st'y dwell., 36′ x 36′; Jno. Shoemaker, owner.

Bermuda St., e s, bet. Buckries and Margaret Sts., laboratory, office, and store-house, and stable, and dwell., 40′ x 118′, 40′ x 68′, 32′ x 40′; Benj. Linfoot, architect.

Thirty-fifth St., cor. Wissahickon Ave., two-st'y stable, 113′ x 116′; Wm. Mackie, contractor.

Fifty-second St., cor; Wyalusing Ave., two-st'y stable, 20′ x 38′; L. C. Smith, contractor.

Moore St., n s, w of Second St., 2 three-st'y dwells., 16′ x 30′; David Trance, owner.

Columbia Ave., e and w of Forty-second St., 3 three-st'y dwells., 15′ x 38′; R. J. Dobbins, owner.

Cumberland St., n e cor. Aramingo Canal, two-st'y warehouse, 37′ x 100′; Jno. T. Lewis & Bros.

Twenty-first St., bet. Reed and Garrett Sts., 6 two-st'y dwells., 16′ x 36′; Dan'l McGettigan, contractor.

Wishart St., n s, e of Frankford Road, two-st'y stable, 16′ x 33′; W. H. Ewing, owner.

General Notes.

Bristol, N. H. — The Concord *Monitor* reports that Hon. Josiah Minot, of Concord, and Hon. S. S. Sleeper, of Cambridge, Mass., have purchased a lot of land. upon which they propose to erect a fine library-building for the town.

Burlington, N. J. — Two cottages to be built for G. H. Todd, Esq.; from plans by Wilson Bros. & Co., architects, Philadelphia.

Chester, Pa. — Madison Street Methodist-Episcopal Church expects to erect a chapel on the ground adjoining the church-building.

Crown Point, Ind. — The Board of Commissioners of Lake Co., having adopted plans and specifications

for a new poor-house, received bids Friday, December 7, 1883, for the erection of said building, to be located at the poor-farm, about three miles east of Crown Point, Ind.

East Hampton, L. I.—Seaside house of frame, outside work shingle, for B. H. Campbell, Esq.; plans by Hazlehurst & Huckel, architects, Philadelphia, Pa.

Fall River, Mass.—Z. Paras is erecting a six tenement block, with a store on the first floor, on the cor. of Webster and Alden Sts.

Germantown, Pa.—George Souders is erecting 8 three-st'y brick houses at Main and Johnson Sts.

Great Barrington, Mass.—James Renfrew, Jr.'s new house on the hill at Adams has been covered, and the inside work begun. Rumor says that it will cost about $50,000.

Iron City, Ala.—A company of southern capitalists is preparing to build a new manufacturing city, on the south side of the Tennessee River, in Alabama, near Mussel Shoals. The site is 100′ above high-water-mark, and it will be named "Iron City." It is at the head of navigation, on the Tennessee, and will be the terminus of at least three railroads, which run through the coal and iron fields of the South.

Kansas City, Mo.—The building committee of the First Presbyterian Church consists of Messrs. F. B. Nofsinger, J. E. Rhoades, P. S. Brown, William Young, Joseph Rayburn, John S. Martin, and J. R. Frith. The new church will be erected at the northwest corner of Tenth St. and Forest Ave., but the plans have not yet been completed.

Newport, R. I.—The voters of Newport have defeated the proposition to purchase a lot and build a poor-house, at a cost of $33,000.

Olneyville, R. I.—An addition is building to the wool-room of the Providence Worsted Mills, 45′ x 120′, and four-st'y.

Palmetto, Ga.—Frame Baptist church, to cost $25,000; Bruce & Morgan, architects, Atlanta, Ga.

Pictou County, N. S.—The Burnside Woollen Mills of Pictou Co., N. S., which were burnt with a loss of $30,000, will be rebuilt.

Bids and Contracts.

Boston, Mass.—The following is a synopsis of bids for all the "Low" tiles and brass frames required for mantels for the post-office and sub-treasury extension.

C. A. Wellington, $440.
Kenderdine & Paret, $480.
Murdock Parlor Grate Co., $412.

The contract hasbeen awarded to the Murdock Parlor Grate Company, of this city.

Georgetown, D. C.—Bids were opened in the office of the District Commissioners for the erection of a home for destitute colored women and children, in accordance with the Act of Congress appropriating $20,000 for that purpose, the plans of which have been completed by the building inspector. The bids were as follows:—

Peter McCartney, $19,925.
R. W. Darby, $21,600.
C. C. Thomas, $18,350.
J. T. Corrigan, $18,300.
W. H. Germann, $22,200,40.
C. C. Martin, $19,286.

Monson, Mass.—The contract for building the new granite town-house has been let by the committee to W. N. Flynt & Co., and work will probably be begun at once. The building is to be finished by May 1, 1885, at a cost not to exceed $35,000.

Montgomery, Ala.—The following is a synopsis of bids for fire-proof covering for iron columns in the court-house and post-office:—

Wight Fireproofing Company, $350.
Ottawa Tile Company, $300 (*accepted*).

The following is a synopsis of bids for wire cloth for the court-house.

The John A. Roebling's Sons & Co., 28 cents per square yard (*accepted*).

Fulton Iron Works, 29¾ cents per square yard.

E. T. Barnum, 31 cents per square yard.

Bromwell Brush and Wire Goods Company, 32 cents per square yard.

Kiely & Voss, 32 cents per square yard.

Kiely & Voss, 27 cents, cloth and staples only.

Gilbert & Bennett Manufacturing Company, 33¾ cents, No. 18, B. W. G.

Gilbert & Bennett Manufacturing Company, 27 cents, No. 19, B. W. G.

Gilbert & Bennett Manufacturing Company, 22½ cents, No. 20, B. W. G.

Clinton Wire Cloth Company, 40 cents per square yard.

Watson & Schalck, 40¼ cents per square yard.

Ravenswood, Ill.—The contract for the stained glass-work on the new Episcopal church, has just been awarded to Healy & Millet, of Chicago, for $500.

Washington, D. C.—November 13, the District Commissioners awarded the contract for constructing a two-st'y and basement brick building, for the National Association for Destitute Colored Women and Children, to J. T. Corrigan, for $18,300, he being the lowest bidder.

The Commissioners also awarded the contract for the construction of the addition to the Industrial Home School, located above Georgetown, to C. Thomas, the lowest bidder, at $4,975.

COMPETITIONS.

COLOSSAL STATUE OF SIR W. WALLACE.

[At Aberdeen, Scotland.]

10 Bridge St., Aberdeen, October 15, 1883.

The testamentary trustees of the late Mr. John Steill, of Edinburgh, hereby notify that they will receive models for a colossal statue of Wallace, in bronze, with basement of granite blocks, to be placed on the mound in the northwest part of the Duthie Public Park, near the city of Aberdeen, in conformity with instructions left by Mr. Steill, at a cost not exceeding £3,000.

Intending competitors, on application, accompanied with a remittance of 10 *s.* 6 *d.*, to Mr. John Otto Macqueen, 10 Bridge Street, Aberdeen, will be supplied with copies of (1) Mr. Steill's instructions, (2) conditions of the competition, and (3) lithograph plan of the Duthie Park, showing sections of the mound.

The author of the accepted model will be employed to execute the work, and the author of that next in order of merit will receive a premium of £50. The trustees do not, however, bind themselves to accept any of the models.

All models must be in conformity with the above conditions, and must be delivered in Aberdeen, free of expense, addressed to Mr. J. O. Macqueen, Municipal Buildings, Aberdeen, **not later than July 1, 1884.**

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MONUMENT.

[At Milwaukee, Wis.]

The committee in charge is now prepared to receive designs and proposals for the erection of a granite monument on the lot in Forest Home Cemetery, in memory of the victims of the Newhall House Fire. The cost of the monument must not exceed $3,000, including the lettering on the monument of the names of the victims.

The foundation will be laid even with the surface of the ground, at the expense of the committee.

The monument is to be erected as early as possible in the season of 1884, and designs and proposals should be sent in **not later than the first day of January, 1884.**

The committee reserves the right to reject any or all of the designs or proposals submitted.

Proposals may be sent to, or any further information obtained from, WM. P. McLAREN,

414 Chairman Committee, Milwaukee, Wis.

PROPOSALS.

PLASTERING.

[At Cincinnati, O.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., November 21, 1883.

Sealed proposals will be received at this office **until 12 M., on the 14th day of December, 1883,** for all the plastering required in the custom-house and post-office at Cincinnati, O., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office or the office of the superintendent.

415 M. E. BELL, Supervising Architect.

GRAVING DOCK.

[At Esquimalt Harbor, British Columbia.]

Department of Public Works,
Ottawa, November 12, 1883.

Sealed tenders, addressed to the undersigned and endorsed "Tenders for Graving Dock, B. C.," will be received at this office until Friday, the 8th day of February, 1884, inclusively, for the construction and completion of the partially finished Graving Dock, at Esquimalt Harbor, British Columbia, according to plans and specifications to be seen **on and after Monday, the 24th December next,** at the Department of Public Works, Ottawa, and on application to the Hon. J. W. Trutch, Victoria, B. C.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and prices affixed to the whole of the items stated therein, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank check for the sum of $7,500 made payable to the order of the Honorable the Minister of Public Works, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the check will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
417 F. H. ENNIS, Secretary.

AGENCY BUILDINGS.

[At New Crow Reservation, Montana.]

Department of the Interior,
Office of Indian Affairs,
Washington, D. C., November 26, 1883.

Sealed proposals, endorsed "Proposals for Agency Buildings on the New Crow Reservation in Montana," which are to be erected about fourteen miles south of Fort Custer, near to the Custer battle-field, on the north of said field and on the west bank of the Little Big Horn, will be received at the office of the Commissioner of Indian Affairs, Washington, D. C., **until 12 o'clock, M., Wednesday, December 26, 1883.**

Complete plans and specifications of the buildings, fourteen in number, and of the work to be done, can be examined at the office of the Agent at Crow Agency, M. T., of the *Inter-Ocean*, Chicago, Ill.; *Pioneer Press*, of St. Paul, Minn.; and *Nonpareil*, Council Bluffs, Io., and at this office.

The contract to be awarded to the lowest responsible bidder or bidders, subject to the approval of the Secretary of the Interior; the right is, however, reserved to reject any and all bids, or any part of any bid, if deemed for the best interest of the service.

Proposals must be made for each building separately, as none will be received for all the buildings in a lump; and proposals must state the length of time required for the completion of each building after the approval of the contract. Time required to complete the building will be taken into consideration.

CERTIFIED CHECKS.

Every bid must be accompanied by a certified check upon some United States depository for at least five per cent of the amount of the proposal, payable to the order of the Commissioner of Indian Affairs, which check will be forfeited to the United States in case any bidder receiving an award shall fail to execute a contract with good and sufficient sureties; otherwise to be returned to the bidder.

The contract will provide for four payments, three of which will be made at such stages of the work as will fully protect the United States: the last payment will be made when the building is accepted.

416 H. PRICE, Commissioner.

PROPOSALS.

WATER-WORKS.

[At Fort Smith, Ark.]

The Board of Aldermen of the city of Fort Smith, Ark., desiring to obtain a system of water-works, will grant a liberal franchise to a company willing to erect and operate the same. To that end propositions will be received up to the **first Monday in February, 1884.** For information address

ED. M. KENNA,
418 Chairman Committee on Water Works.

IRON FURRING AND LATHING.

[At Memphis, Tenn.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., November 24, 1883.

Sealed proposals will be received at this office **until 12 M., on the 14th day of December, 1886,** for furnishing and fixing in place complete, all the iron furring and lathing required for the custom-house and post-office at Memphis, Tenn., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office, or the office of the superintendent.

415 M. E. BELL, Supervising Architect.

ELEVATED RAILROAD.

[At Pittsburgh, Pa.]

Chief Engineer's Office, Pgh., J. R. R. Co.,
Allegheny, November 25, 1883.

On and after December 1st, 1883, sealed proposals will be received at this office for the building of the iron elevated railroad, Pittsburgh Junction R. R. Co., on Thirty-third St., Pittsburgh, Pa., **until December 20th, 1883.**

Plans and specifications can be seen at office of Theodore Cooper, Consulting Engineer, No. 35 Broadway, New York city, or at office of the Chief Engineer, in P. & W. R. R. Depot, Allegheny City, Pa.

H. A. SCHWANECKE,
416 Chief Engineer P. J. R. R.

FLOATING GATE OR CAISSON.

[At Mare Island, Cal.]

Navy Department,
Bureau of Yards and Docks,
Washington, D. C., November 12, 1883.

Sealed proposals, addressed to the Chief of the Bureau of Yards and Docks, Navy Department, Washington, D. C., indorsed, "Proposals for Floating Gate," will be received at this Bureau by the undersigned **until 1 o'clock, P. M., of Tuesday, the 22d day of January, 1884,** at which time and place the proposals will be opened in the presence of bidders, for furnishing the necessary labor and material for the construction of a floating gate, or caisson, for the dry-dock at the Mare Island Navy Yard, California.

Plans of the floating gate, or caisson, and all attachments thereto, can be seen, and copies of specifications and instructions to bidders obtained, by applying to the Bureau of Yards and Docks, Navy Department; the Civil Engineer's Office at the Mare Island Navy Yard, California; or the Navy Pay Offices, at No. 17 State St., New York City, and No. 45 Milk St., Boston, Mass.

The Bureau reserves the right to reject any or all bids that may not be deemed advantageous to the Government.

No proposal will be considered unless accompanied by the prescribed bond which forms a part of the same. EDWARD T. NICHOLS,

417 Chief of Bureau.

INDUSTRIAL SCHOOL.

[At Devil's Lake Agency, D. T.]

Department of the Interior,
Office of Indian Affairs,
Washington, D. C., November 23, 1883.

Sealed proposals endorsed "Proposals for the construction of an Industrial School-building at Devil's Lake Agency, D. T.," will be received at this office **until Wednesday, December 19, 1883, at 12 o'clock, M.**

Complete plans and specifications of the work can be examined at the office of the *Inter-Ocean* of Chicago, Ill.; the *Pioneer Press* of St. Paul, Minn.; the *Bismarck Tribune* of Bismarck, D. T., and at the agency.

Bids are requested for building complete, with the basement, and also without the basement, as per plans and specifications.

The contract to be awarded to the lowest responsible bidder or bidders, subject to the approval of the Secretary of the Interior; the right is, however, reserved to reject any and all bids, or any part of any bid, if deemed for the best interests of the service. Time required to complete the building will be taken into consideration, and proposals must state the length of time required for the completion of the building after the approval of the contract. Each bid must give the names of all parties interested in or parties to it, and a copy of this advertisement must be attached to bid, with post-office address.

CERTIFIED CHECKS.

Each bid must be accompanied by a certified check or draft upon some United States depository, payable to the order of the Commissioner of Indian Affairs, which check or draft shall be not less than five per cent on the amount of the bid, and shall be forfeited to the United States in case any bidder receiving an award shall fail to execute promptly a contract with good and sufficient sureties, according to the terms of his bid; otherwise to be returned to the bidder.

Bids not accompanied by a certified check or draft will not be considered.

Parties receiving awards will at once enter into contract.

The contract will provide for three payments, two of which will be made at such stages of the work as will fully protect the United States; the last payment to be made when the building is completed and accepted.

H. PRICE,
416 Commissioner.

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CONTENTS.

THE New York Board of Fire Underwriters has undertaken to influence building in a new, and very promising way, by defining what shall be regarded by underwriters as a "standard building," and establishing various penalties, in the shape of extra premium rates, for any deviation from the model. The description of the standard building, as adopted at a recent meeting, specifies that it shall not exceed five thousand square feet in area; that all its walls shall be of brick, of the thickness required by the present city building law, having corbelled projections to receive the floor-beams, and all carried up above the roof and coped; that its roof shall be of iron or copper, or brick or concrete of some kind approved by the Board, all supported upon iron rafters; that cornices and gutters shall be of metal; that all party-walls shall be carried up four feet above the roof; and that all exterior openings above the first floor shall have iron shutters, of which one vertical row on the front must be arranged to open from the outside. The standard building will also contain no open hatchways or elevators, and its stairways are to be enclosed by partitions and doors. The additions to the premium rates incurred by violating these principles vary from five to one hundred cents on one hundred dollars, representing an augmentation of from five to one hundred per cent, so that it is apparently the intention of the underwriters to make it worth while for owners to conform to the standard. To us the idea of constituting a model for building, from the underwriters' point of view, seems to be an admirable one; not only making it much easier for property owners who wish to secure the best terms of insurance to accomplish their object than has hitherto been the case, but providing a skeleton, so to speak, to which can be added the best future improvements in the art of cheap incombustible construction. Among the inexpensive devices of this kind, for instance, which deserve to be incorporated in the underwriters' ideal, is that of securing the plaster to the ceilings by means of wire, either in the form of wire-lath, or as a network put on over the first brown coat, and secured by nails, in the manner now very common. To say nothing of the security which such wiring offers against the shaking down of basement ceilings by trucking heavy goods over the floor above which is to be observed in most stores not so protected, exposing the hollow wood construction of the floor at its most vulnerable and dangerous point, the wiring of the ceilings, by preventing the plaster from falling when the laths which hold it are warped and curled by the heat, enables them to defend the wood-work behind them for a long time against a fire burning below, and, what is nearly as important, assists them in retaining water which may be thrown into the rooms above, and leaks through the flooring. An ordinary plastered ceiling, as every one knows, will fall in a few hours, or even minutes, if a weight of water is allowed to accumulate above it, while a ceiling wired in either way will sometimes remain tight for weeks, with the exception of a slow filtration, even though the water may stand a foot deep over it.

A GREAT deal of trouble has been caused in New York by the natural water-courses, which in the progress of the city toward the upper end of Manhattan Island have been, for the most part, simply filled up with rubbish, and streets and houses built over them, the stream, of course, continuing to run slowly through its ancient channel below. The principal source of supply to the brooks being now the street-wash, they have become very foul, and threaten the health of those who live over or near their course by malarial, or even worse diseases, as well as by the dampness which exhales from them. It is said by old and experienced physicians that the course of all the principal streams which existed as brooks a century or so ago can still be traced by noting on the map of the city the lines of greatest prevalence of malarial diseases, but a more ready means of ascertaining them is to be found in an excellent map, made up some years ago from ancient authorities, and representing all the brooks and marshes which now lie concealed beneath the streets and houses. From this map it appears that about twenty-five hundred acres of land in the city still remains saturated with slowly-flowing fresh water at a small distance beneath the surface, while about the same amount has within a few years been drained by sluices, conveying the subsoil water to the rivers.

ONE can hardly learn without a blush that the astonishing "invitation to artists" composed by the managers of the Garfield Monument Association has been, by request of the diplomatic representatives of the United States, published in the foreign technical journals, where its mean and ignorant assurance appears doubly conspicuous by contrast with the terms of competition usually found there. As we find it rendered in *La Semaine des Constructeurs*, we are glad to notice that an error in translation has made one of the preliminary clauses unintelligible, so that one may hope that the great French sculptors, for whose eye the notice is intended, will become confused, and lose their interest in the subject, before they reach the humiliating items which announce that "the Commission reserves the right to reject all or any of the designs;" and that "the designs of superior merit in the opinion of the Commission will receive an award, for the best, of one thousand dollars," and so on, concluding with the stipulation that "the premiated designs," (together with all the rejected ones not called for within two months after the decision,) "shall become the property of the Commission." One can imagine the comments of the guests at a sculptor's reception in Paris upon this precious document, and the enthusiasm with which M. Falguière, for instance, will prepare himself for six months' hard work upon a model to be judged by a commission of Yankee financiers whose idea of an "image" or an "emblem" is but too clearly foreshadowed in the language of their circular, and which, if it should receive their suffrages, would be rewarded with one-fifteenth of the usual remuneration, and appropriated by the committee to be carried into execution in the way which might please them best. It is instructive to notice on the next leaf of *La Semaine* a paragraph mentioning that a competition after the French fashion had just been decided at Beauvais. The subject of this competition was a design for *a sofa*, and the prize was an award of four hundred dollars in money, nearly half the amount that the Garfield Commission thinks sufficient compensation for the best design for the most important, and in many respects the most interesting work of pure art which it has yet been attempted to erect in this country.

A SERIOUS complaint is made by Mr. Rebisso, one of the sculptors who took part in the competition for the Garfield monument at Cincinnati, in regard to the method in which the award was made; and so far as appears from his letter to the Cincinnati *Commercial Gazette*, he is certainly justified in his strictures. It seems that the circular to artists, issued by the committee in charge, invited each of those who received it to submit a "model" for the statue, "of the height of eighteen

inches, the measure being taken from the sole to the crown of figure." Three out of the four competitors understood this to mean that only one model was to be submitted by each, and sent their designs in accordance with this interpretation, keeping, moreover, the dimensions strictly within the stipulated limit. The fourth competitor, who has probably more experience of non-professional committees than the others, submitted four models, one of them being twenty-two inches high instead of eighteen. This model was selected by the suffrages of the committee and adopted. To Mr. Rebisso the selection of the design of a sculptor who deliberately violated one, if not two, of the plain requirements of the programme seemed unfair, and in concert with the other unsuccessful competitors he protested against the admission of the irregular models, only to find his letter treated with contempt.

MR. REBISSO'S inference from these proceedings, that the members of the committee were actuated in their decision by "ill-concealed favoritism," rather than judicial integrity, hardly seems to us to be justified, but it is none the less certain that any committee which, whether ignorantly or not, receives and rewards a design prepared in violation of the stipulations of the programme, makes itself a party to a successful fraud upon the rights of the more conscientious competitors, and can, we think, be held responsible to them for all the trouble and expense which they have been at in following out the programme which the committee chooses to disregard. The fact is that the members of committees of this kind, like other business men, are so accustomed to looking upon the artists or architects who scramble after their "jobs" as an exquisitely helpless sort of fools, that the idea of paying any regard to their weak complaints does not occur to them; and it is unfortunately also true that competitors of intelligence and responsibility, ashamed, after the competition is over, to have it known that they condescended to participate in it, will generally submit to the most bare-faced breaches of faith without any attempt to make their rights respected. In the present case, supposing the assertions of Mr. Rebisso to be true, the submission by any competitor of a model larger in scale than those of his rivals unquestionably destroyed at once the fairness of the competition. The merest tyro in such matters knows the increased conspicuousness and apparent importance of a model somewhat bigger than those about it, and with the average committee-man, as every experienced competitor understands, this quality counts for more than all the rest; so that one who has reason to suppose that the committee will pay no regard to the stipulations in this respect can easily obtain a great advantage over his rivals. There are many other tricks of the professional competitors, among them, for instance, the well-worn but most effective one of withholding a design as far beyond the specified time as the patience of the committee will allow, in order to give it the advantage over those already received of novelty and gratified anticipation; but it is not necessary now to consider these. The point to which we wish to call attention is that competitors so defeated have full redress at hand, if they will only pluck up courage to ask for it. A programme inviting designs, no matter how brief it may be, constitutes a valid contract between the persons issuing it and all those who accept the invitation and submit their designs in accordance with it. Not one word of this contract can be waived or modified by one party without the express consent of all the individuals who form the other party, and if any breach of the stipulations is committed by either party, any of the persons who constitute the other may, as we think, insist upon their contract, and require payment in full for all the work which they may have done in accordance with the published terms.

TWO very serious conflagrations took place last week in Europe, one destroying six hundred houses in a poor suburb of Constantinople, while the other, after burning for more than a day, consumed the interior portion of one wing of the Palace of the Belgian Legislature, at Brussels, with many valuable documents and other objects, the whole loss being estimated at about two and a half million dollars. It is a long time since so serious a fire has occurred in any European public building. With the exception of the Hôtel de Ville and the Tuileries at Paris, which the ingenious malice of the Commune with difficulty succeeded in destroying, the only important structure which has suffered by fire for many years seems to have been the Louvre, which, in consequence of a change in the heating apparatus, took fire several times within a few months. Constantinople, unlike the more civilized cities of the Continent, is very subject to extensive conflagrations, the houses in the poorer portions, and particularly in the suburbs, being mostly of wood, and crowded together.

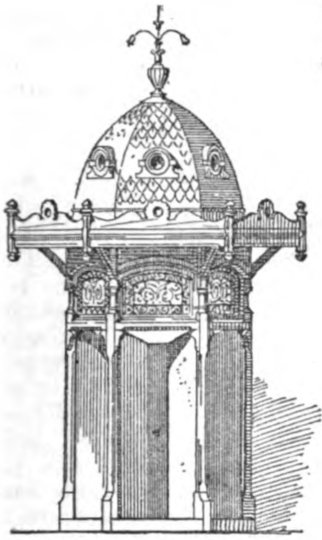
IT seems, from an account given in the New York *Tribune*, that the work upon the Hudson River Tunnel is suspended, nothing having been done on the New York side since July last, and nothing on the New Jersey side for about a year. The excavation and the caisson on the New York side of the river have been allowed to fill with water, but on the opposite side an effort has been made to keep the tunnel clear. Nothing is said about any accident to the work, and as no difficulty is found in clearing the western portion of accumulated water, no defect of importance probably exists, and the suspension of active operations may be due merely to lack of funds. It is certainly to be hoped that so important an enterprise will not be abandoned at this point. If we are not in error, the subaqueous excavation is already longer than any other tunnel in existence, and the most difficult steps have already been taken.

A QUARREL has been raging for some time in the bosom of a quiet New Jersey village, and the participants, too prudent to indulge in warlike encounters, have devised some singular methods for gratifying their hostile feelings. The quarrel arose, as such conflicts sometimes do, upon the occasion of the erection of a church in the town. The village is divided by a stream, and naturally enough, the inhabitants of each division wished the building placed on their side. The question was decided by an agreement that the church should be built in the district which should contribute the most money toward its cost; and as the people of the west side proved the most generous, the building was placed among them. Unfortunately the east-siders conceived a suspicion that the church treasurer, who was a west-sider, had so manipulated the contributions as to secure an apparent, but not a real victory for his party, and their resentment at this supposed wrong soon made itself felt. To soften their anger, a young lady from the east side was appointed organist to the church; but some inconsiderate west-siders, aggrieved by the suspicions of the others, and seeing an opportunity for revenge, attacked the young lady organist by means of anonymous letters, and at last succeeded in driving her away, and procuring the appointment of a west-sider in her place. It may be imagined that the dissension was not allayed by this proceeding, and on the first Sunday after his appointment, when the new organist went to assume his post at the church, he found the organ transformed into the likeness of an immense bird, by means of a coat of tar and feathers applied all over it. The congregation very naturally laid this performance to the friends of the dispossessed organist, but they denied it, and charged it upon the west-siders, who, as they said, wished to injure the young lady's reputation. The result of the strife will probably be a separation of the village into two congregations, the east-siders contributing some more money, and building a church for themselves.

AN excellent example for future occasions has been set in arranging for the preliminaries of the competition for the extension of the Museum at Berlin. About three hundred and fifty copies of the programme were sent out, so that the number of competitors will probably be little less than a hundred, and notice was given that on a certain day the authorities of the Museum would meet the intending competitors, to answer questions in relation to any points of the programme which seemed obscure, or to explain matters not mentioned in the programme. The meeting took place as announced, and was attended by a large number of architects. Thirty-two questions were put, and answered clearly and fully by the representatives of the Museum, for the benefit of all present, so that the competitors who took the trouble to go to the meeting will be able to set about their designs with tolerable certainty that their time will not be thrown away. We commend this feature, as well as the others which distinguish real competitions for important work abroad, to the attention of those who wonder why respectable architects in this country cannot be induced to waste their time and money in the cheap scrambles which go under that name here.

SANITARY PLUMBING.[1]—XII.

LATRINES AND TROUGH WATER-CLOSETS



ARE designed for use in public places where an attendant can be employed to take constant charge of them, and where water is so abundant that its extravagant consumption is no disadvantage. Trough water-closets consist of a long reservoir or trough, inclined towards one end, where a discharge-plug is placed, and having a single or double row of water-closet seats placed over it, so that all the closets are flushed together, or, in other words, so that the flushing of one necessitates the flushing of all the rest in the series connected with it. They are constructed in different manners, either of brickwork having vertical sides and rounded bottom, or of iron, usually enamelled.

Latrines (Fig. 29) are practically trough water-closets having the trough diminished in size, and a bowl or funnel discharging into it under each seat. The bowls are constructed of earthenware or white enamelled iron, and the trough or pipe with which they are connected is made of iron, and has a trap at its end under the discharge-plug. In the figure the discharge-plug is hollow, and consists of a stand-pipe with overflow-passage through it. The height of the overflow regulates the position of the standing water in the bowls. The plunger or discharge-plug is under the control of the attendant, who flushes the closets as often as he considers it advisable. The bowls are so constructed that the waste matters fall directly into the standing water, and nothing strikes their dry sides; they are thus partially deodorized. But the liquid and soluble portions of the solid wastes, which are allowed by the faithful attendant to remain for some length of time in the latrines, as well for the sake of economizing water as to enable him to attend to his other duties, soon precipitate a slimy deposit all along the inner surface of the closet, and particularly around the plunger-chamber. This is not easily removed, and always forms more or less of a nuisance. In most cases it will be found much better to provide, instead of latrines, a row of good hopper-closets, with treadle, door or seat attachment for automatic flushing, if desired.

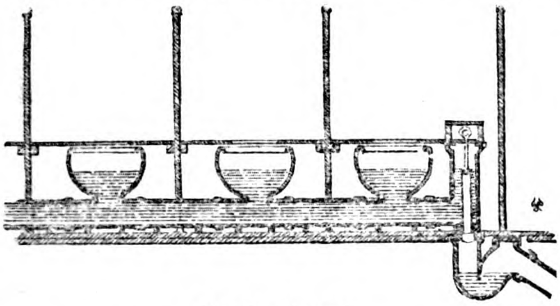


Fig. 29.—Latrines.

SLOP-SINKS, SLOP-HOPPER SINKS, AND SLOP-HOPPERS.

Figures 30, 31 and 32 represent three kinds of fixtures designed for the reception of slops. The first and second have no means provided for the flushing of the walls of the sink; the last is provided with a flushing-rim for the purpose. But the use of the flushing-rim in private houses is oftener neglected than observed. Servants will not take the trouble to thoroughly cleanse the slop-hopper at every usage, and it soon begins to emit a disgusting odor. In hotels or large club-houses, where their use is constant and under systematic supervision, where special attendants are detailed to take charge of them, and where each story is independently provided with a separate slop-hopper, their use may be recommended; but in private houses they should never be allowed. A good hopper water-closet, with a strong enamelled-iron drip-tray to protect the bowl, is much better, inasmuch as, while it serves the purposes of the slop-hopper equally well, it escapes its objections by ensuring a periodic flushing. Every time the closet is used for the purposes of nature it is thoroughly flushed, and even slops are much seldomer allowed to stand in the bowl, because their presence would be immediately detected by the next regular user of the water-closet, and the damage would be likely to recoil upon the head of the offender. It is customary in private houses to place the slop-sink in the attic, but no house-owner can give any better reason for its existence there than that he had seen it in some other houses. When valve, pan and plunger closets were used to the exclusion of the more modern hopper, the slop-sink had a certain *raison d'être*. In these closets, especially those requiring an overflow-passage, the closure of the outlet is apt to cause an overflow of the slops when a large pailful is poured in quickly. But the modern hopper-closet has a clear, open passageway into the drains, and, being provided with the most improved form of flushing apparatus, is, in fact, the best form of slop-hopper that has been devised. Some persons who have insisted, even contrary to the advice of their architect or sanitary engineer (who now unite in condemning them), upon having the customary slop-sink duly installed in their attics, wishing to have at least an appearance of a reason for their waywardness, urge that the virtue of the slop-sink lies in the strainer: this serves to prevent the obstruction of the drain by scrubbing-brushes, rags, large cakes of soap, or other household articles used in scrubbing, capable of clogging the soil-pipe, which a careless servant might throw with the slops into the sink. This office of the strainer is certainly a useful one, and if every story in the house contained a slop-sink provided with such a guard, and every water-closet had a movable or portable strainer endowed with sufficient intelligence to close the outlet only when slops were poured in, the soil-pipes might really be protected from the gross carelessness of our friends so much feared. But as such a profusion of slop-sinks and strainers is evidently impossible in private houses, and as slops are collected in every story of the house as well as in the attic, and as no servant careless enough to throw scrubbing-brushes into a water-trap would take the trouble to lug slops from the lower stories up to the attic, in order to protect the neighboring water-closet trap from such an accident, or, in other words, mount one or more flights of stairs to avoid the trouble of removing the scrubbing-brush from the slop-pail before emptying the slops into the nearest water-closet bowl, it is evident that the argument of protection to soil-pipes has little weight.

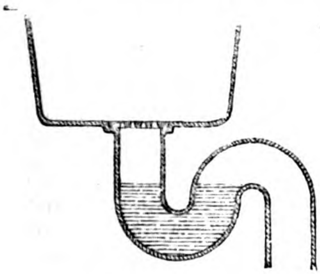


Fig. 30.—Slop-Sink.

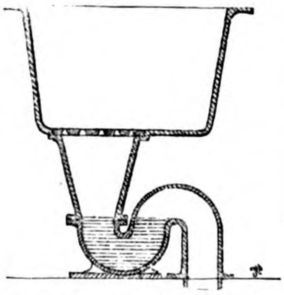


Fig 31.—Slop-Hopper Sink.

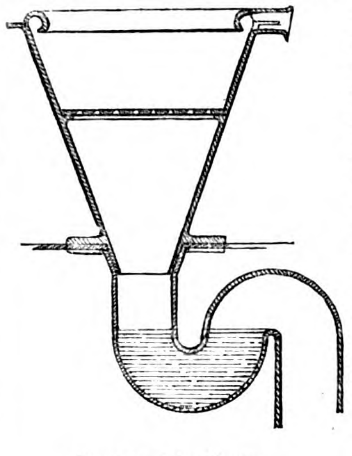


Fig. 32.—Slop-Hopper.

For hotels and some other public buildings, the best and only proper form of slop-sink is the so-called "slop-hopper" of Figure 32, which is superior to the others in having a good flushing-rim. But the bowl should be properly protected by a stout iron drip-tray, properly supported, to receive the frequent blows bestowed upon the hopper by the careless pail.

URINALS.

As they are generally made, urinals are very objectionable things in private houses. Urine undergoes rapid decomposition, and gives off a powerful and very disgusting odor. When in this state, it has the power of turning fresh urine into the same condition almost immediately, so that unless the urinal is so formed and placed that its surfaces are thoroughly cleansed after use, it soon becomes a very foul and disagreeable fixture in a house. Figure 33 represents the most economical form of urinal, as they are now made. The bowl is generally constructed of glazed earthenware, with some form of fan or flushing-rim for spreading the flushing stream over its entire interior surface. The urine escapes through numerous perforations in the bottom and back of the bowl, into the waste-pipe. In some forms the trap is made in a single piece of earthenware with the bowl. There are a number of different forms of urinals, both swinging and stationary, and they are flushed either by a stop-cock directly on the supply-pipe, to be turned by hand, or by a special cistern. The former method of flushing is open to the same objection as the direct supply to water-closets, and is now forbidden in some places by law. The pressure may be at times insufficient to fill the pipes,

Fig. 33.—Urinals.

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[1] Continued from page 272, No. 415.

and the foul air from the surfaces of the urinal, perhaps containing disease germs, may be sucked into the supply-pipes on opening the stop-cock. In the figure, an automatic flushing-cistern is used, which has within it a tilting vessel arranged to give a periodic flush as it slowly fills under a small faucet kept constantly open. This is perhaps the only certain method of ensuring a sufficient flush for single urinals constructed in the usual way; but it involves a great consumption of water and is very wasteful, inasmuch as the flushing goes on always, whether it be required by the use of the urinal or not.

For private houses it is much better to construct the urinal in the manner shown in Figure 34. It is a simple hopper-closet raised to the height of a urinal. By this arrangement, all of the advantages of a urinal are obtained, without any of the objections. Moreover, by stepping upon the steps or foot-rests at the floor in front of the fixture, the device serves equally well as a water-closet. The writer has found by experience that this form of urinal never becomes foul, nor is its use as a water-closet accompanied by the least inconvenience. He has used it both in public and private buildings with equal success. The bowl, containing a large body of standing water, dilutes the urine, and prevents its fouling the sides. Habit, with water-closets, leads to its flushing after its use as a urinal at times when the ordinary form of urinal would have been left unflushed. But should, by any chance, the flushing be neglected, the next use of the fixture as a water-closet would ensure its cleansing. Moreover, by combining the two fixtures in one, economy both of space and first cost is obtained, while the offensive appearance and smell of the urinal is avoided and the consumption of water is greatly diminished. Not the least of the advantages of this arrangement is that it is suitable for use by both sexes, a consideration of some importance, especially in the hall of a private house, where the want of space limits one to the use of a single fixture.

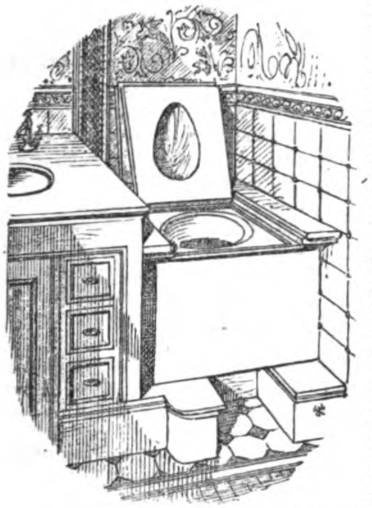


Fig. 34.—Combined Urinal and Water-Closet.

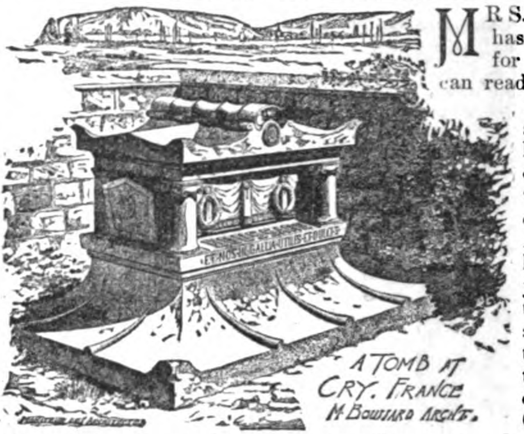
In public buildings, however, such as hotels, railway-stations, manufactories, school or club houses, where proper and systematic attention may be expected to be given to them, urinals may become not only desirable, but absolutely necessary. Stall urinals should also be constructed in various places in the main thoroughfares, easily accessible to the public, as an important sanitary measure.

The initial cuts at the beginning of this chapter and of Chapter VI represent ornamental isolated urinals for the public thoroughfares, and Figure 35 shows a stall urinal, more suitable for use under cover, as in railroad-stations and public buildings. These urinals are usually made of iron lined with marble, slate or plate-glass. The water-supply is generally constant in public urinals for the streets, but in railroad-stations and hotels it is controlled by valves operated either by a treadle arrangement or by the door of the apartment in which the urinal is placed, or it is operated by a special attendant. In the distribution of water to public urinals, care should be taken that not only every part of the urinal should be properly washed, but that also the trough at its foot, which receives the drippings, should be cleansed. It is calculated that for stall urinals having a constant supply, the consumption of water often equals a half a gallon per minute per stall.

Fig 35.—Stall Urinal.

The width of the stall should not be less than two feet, as some persons will not enter a narrow stall; so that a narrower one would lead to the formation of a nuisance outside the urinal. An open grating should be provided below the feet, and below this an inclined floor, which should be washed by the distributing-pipe. The division between the stalls should also be flushed. In many urinals these divisions never get washed, and consequently such urinals are never entirely free from smell. The best of ventilation should always be provided in the building where urinals are placed. In constructing a public urinal the aim should be to confine the urine to as narrow limits as possible, in order to economize the supply of water. Hence the ordinary urinal basin (Fig. 33) is to be preferred where it can be used. Unfortunately, however, these are generally too high for small children; hence the plain slab shown in Figure 35 is sometimes required. The divisions should not exceed five feet in height: beyond this there is only a waste of material, and more surface to be kept clean.

A LIFE OF FROMENTIN.[1]



MRS. ROBBINS has done a work for which American readers should be grateful, in supplementing her translation of Fromentin's "*Old Masters of Holland and Belgium*," published nearly a year ago,[2] by this translation, similar in external form, of the biography of the master. Gonse's life is not an exhaustive one by any means. It consists of a collection of papers first published in the *Gazette des Beaux-Arts* (of which he is the editor), and gives much more place to a criticism of Fromentin as painter and writer, than to an account of him as a man. There is, indeed, a brief biographical chapter clearly and sympathetically written, but it gives us little more than an outline or glimpse of a personality that must have been extremely charming. A little further insight, however, is fortunately afforded by a few letters of Fromentin's written to George Sand, which are introduced when the works of which they speak are criticised. Frenchmen, whether they write books or letters, are apt to be more outspoken in personal matters, more self-revealing, more naïve, if you will, than we who speak the English tongue. So one is not surprised to find these few epistles of Fromentin's giving us a better idea of the inner character of the man than is often afforded by a whole volume of similar documents in our own vernacular. So charming, so interesting is the personality thus suggested, that these few pages are among the most valuable in the book, and provoke an earnest wish that more of Fromentin's correspondence might be given to the world.

After all, however, what we are chiefly concerned with in an artist is his art, and to Fromentin's art—to his arts, to speak more correctly—M. Gonse gives careful and unbiassed attention. He studies him first as a painter, then as a writer, and in each case goes to work with a very keen critical insight, a very impartial mind, and a peculiarly French felicity of brief and telling speech. Such a study of such a master must be profitable to every reader who interests himself in art, and it would be well indeed for such if all the great men of Fromentin's generation might be presented to them in similar fashion. Fromentin was not, as a painter, the most important among them. I should say he held a very high place in the second rank of modern French artists, rather than a place among the very first. But his talent was eminently individual, and as such merits to be examined by and for itself, and not merely as complementary to the talents of other men. The analysis which M. Gonse makes of it seems to me eminently just, in spite of his personal friendship for the painter—a thing we can not often say, by the way, of similar sketches in our own tongue. He sees Fromentin's deficiencies as clearly as another, but rightly concludes that they are but slight and unimportant defects in an art of great elegance, distinction, refinement, ideality and personality. I need not here quote his analyses and conclusions, as the book is within reach of every one, and as any abstract could give but a mangled idea of such delicate and clever writing. Fromentin's works are sufficiently well known and appreciated in this country, I think, to attract many readers to the volume.

But interesting as he is as a painter, Fromentin seems to be much more remarkable as a writer. M. Gonse himself rates his literary work above his pictorial, placing the one in a high class, but the other in the very highest. Nor can any one hold that he speaks too boldly, since, though he had produced but four small volumes in all, Fromentin would have been admitted to the French Academy on the strength of their merits, had not his premature death intervened. These books are: a novel called "*Dominique*," which is most beautifully written and full of attractive and interesting thoughts, (valuable, moreover, as being in some degree autobiographical,) but which *as* a novel is hardly a success; two volumes of travel in Africa, and the "*Old Masters*" already referred to. No such exquisite work in the same line has ever been done as the two volumes of travel, "*A Year in the Sahel*," and "*A Summer in the Sahara*." The author's gifts as a painter gave him a marvellous power of vision, a marvellous sensibility to effects of color and light and form, and these were supplemented by a literary gift of even greater power: a command over his language unrivalled by any descriptive writer, and an ear for the subtleties of style that had been cultivated by early poetical attempts and produced some of the most wonderful work to be found in all the wonderful gallery of French prose writing. Even Théophile Gautier, as M. Gonse says, seems almost commonplace as compared with Fromentin as a descriptive writer—even George Sand is not quite his equal. The finish, the nicety, the keenness, the exactness of his language are only equalled by its ease, its grace, its charm.

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[1] *Eugène Fromentin, Painter and Writer.* By Louis Gonse. Translated by Mary Caroline Robbins. Boston: James R. Osgood & Co., 1883.

[2] See *American Architect* for December 9, 1882.

He absolutely transports us to the scenes he is describing, and steeps us in an illusion the memory of which long remains. There is no bold synthetic painting, no attempt to condense an impression into a few main points, and to dwell upon these with such force as to stamp them vividly on the mind. On the contrary, his effects are produced by an accumulation of details such as could only have been perceived by a painter's eye, and such as could only have been painted by a consummate artist in words. It is impossible to give those who do not know these books any idea of the magical descriptive power of Fromentin, or of the way in which he so mingles it with personal feeling and with dramatic incident that it never becomes tedious, as word painting does in the hands of a lesser master. To me they seem the most wonderful pieces of prose writing I have ever read, making the work of other men seem gross and clumsy in comparison, and all other books of travel the commonplace records of what has been seen by commonplace eyes. They could never be translated into English without losing much of their charm, and those who love them best must be the last to wish to see the task attempted.

With the "*Old Masters*" the case is different. The style is here almost as exquisite, almost as impossible to render perfectly in English. But there remains so large a residuum of incomparable criticism, even after part of its charm has evaporated, that we gladly welcomed Mrs. Robbins's version. The most remarkable thing about Fromentin is, as M. Gonse points out, not that he was at the same time a great writer and an admirable painter, but that he kept the two branches of his work so entirely apart from one another. His painting has not the first shadow of the "literary" flavor we so often find in the works of those, even, who cannot write at all. And his writing is as absolutely perfect in form as though he had done nothing else all his life; yet it was but his secondary concern, filling in the gaps left when brush and palette were laid by. M. Gonse seems half to regret that the division of his labors was made in just this way. However this may be, it is certainly a misfortune that Fromentin could not have had a life twice as long as that of other men, since to him Nature had given a double endowment, the full development of either branch of which might easily have occupied three-score years and ten. It is not in quality that we count our loss. He could never have written better, since he wrote more perfectly than any other man; and though his painting was steadily progressing, and though he died comparatively young, yet we may believe that here, too, he could hardly have gone beyond the point he attained when at his very best. But what have we not lost in quantity by his dying at the age of fifty-six! Those who see as I do in the "*Old Masters*" the finest and most vital and instructive piece of pictorial criticism that was ever written in any tongue, will be moved to deep regret when they find from this biography that Fromentin projected at different times of his life several schemes for other books, some of which, at least, would probably have been executed had he lived a few more years. These included other studies of the old masters of former days; a sketch of the rise of modern developments; an examination of the collections at the Louvre; and a study of Corot. It is hard to say which work would have been the most valuable. It is easy to agree with his biographer that, Fromentin leaving them undone, they will never be written with the same degree of excellence; for when again shall we have a man with such an endowment as Fromentin's — the eye of a true painter joined to a temperament of extreme sensibility, to catholicity of taste, to the brain of a critic of the very first rank, and to the pen of a French prose writer of the very highest class? French artists are better writers as a rule than English, and much better critics, and French literary men have a far keener natural sense for art, and a far better education therein, than their English-speaking brethren; but there is not a chance in a million that another personality will be developed uniting both these talents, and having each in so rare a degree of perfection as was the case with Fromentin. Feeling what we have been defrauded of, therefore, we are all the more grateful for the unpublished fragments from Fromentin's note-books and portfolios which M. Gonse has incorporated into his volume. The "*Note-Books in Egypt*," published as an addendum to the French edition, have not, however, been included in the translation.

The etchings and large plates which appeared in the former are also omitted here. We get no versions of Fromentin's completed works; only a number of his sketches and studies. These, however, are well reproduced, though sometimes on a smaller scale than in the original volume. They will be most interesting to those who know the painter's work, though they can give no idea of it to unfamiliar eyes.

Mrs. Robbins's translation seems to me more nearly perfect than was her version of the "*Old Masters*," — a circumstance that might have been anticipated from the fact that though M. Gonse is an excellent and elegant writer, he is after all not a Fromentin. In spite of occasional slips and some instances where the translation is not as close as it might have been, much of the spirit and grace of the original is preserved, and the work as a whole may be said to be sympathetically and satisfactorily done. Students are to be congratulated, not only that the book has now been opened to those who read English alone, but also that it is furnished them in so good a shape.

M. G. VAN RENSSELAER.

"*TRUTH*" AND ILLICIT COMMISSIONS.

"A MAN building his own house has every one against him. Theoretically he is protected by his architect, but as the architect is paid a commission on the amount spent, it is his interest to make that amount as large as possible. It almost invariably happens, too, that the architect is paid a second commission by those whom he employs, and thus becomes their slave. This, of course, is fraud; but architects apparently do not think so. In almost every article used in building a house there is a trade price and a general public price. The architect should insist on the trade price, but were he to do so he would not get a commission from the vendors. Whenever an architect particularly recommends mantel-pieces, or grates, or any such articles which are made by some particular firm, it is fifty to one in favor of his having a personal reason for the suggestion." — *Truth, October* 18, 1883.

The following correspondence lately appeared in *Truth*, and has reference to the foregoing remarks recently made by the editor of that journal concerning architects and commissions: —

ROYAL INSTITUTE OF BRITISH ARCHITECTS,
9 CONDUIT STREET, HANOVER SQUARE, LONDON, W., November 6, 1883.

Sir, — The attention of the Council of the Royal Institute of British Architects has been called to a paragraph in *Truth*, of the 18th ult., in which you inform your readers that "almost invariably the architect is paid a second commission by those whom he employs;" that he does not consider such a course of procedure to be a fraud; and that "whenever an architect particularly recommends mantel-pieces, or grates, or any other such articles, which are made by some particular firm, it is about fifty to one in favor of his having a personal reason for the suggestion."

We are directed by the Council to state, in the most unqualified manner, that the accusations thus brought against architects are, as far as they regard the members of this Institute, calumnious and untrue.

On the assumption, however, that before venturing to make accusations so sweeping, and so damaging to an honorable profession, as those to which we refer, you were in possession of facts injuriously affecting individual architects, we are directed to invite you to communicate to the Council their names and addresses, in order that some action may be taken thereon. Every Fellow and Associate of the Royal Institute of British Architects is bound by a written obligation *not* to receive or accept any pecuniary consideration or emolument from any builder or other tradesman whose works he may be engaged to superintend, and *not* to have any interest or participation in any trade contract or materials supplied at any works the execution of which he may be engaged to superintend. The proved infraction of these fundamental rules involves immediate expulsion from the Institute.

We beg leave to enclose for your information a list of our members, and we are to request that you will accord to this letter publicity equal to that given to the serious accusation it refutes.

We remain, sir, your obedient servants,

J. MACVICAR ANDERSON, Hon. Secretary.
WILLIAM H. WHITE, Secretary.

Sir, — I am in receipt of your letter, in which you refer to certain paragraphs which have appeared in *Truth* respecting architects, and in which it is alleged that many are in the habit of receiving a second commission from those whom they employ, in addition to that paid to them openly as architects, and you ask me to communicate to your Council the names and addresses of any architects who are members of your Institute, and who have received such commissions.

It must be obvious to you that if the allegations be correct, it is impossible for me to accede to your request, for the tradesmen who give the commissions would not wish in their own interests to have their names made public.

I shall, however, have much pleasure in publishing your letter, which you say is a refutation of my statement, so far as the members of your Institute are concerned; but in doing so, I shall also publish my reply.

As I understand the position of an architect, it is this: He is employed by an individual who is about to build a house. He receives a commission of five per cent on expenditure. In return, he is expected to make plans, to see that the work be well and efficiently performed, and to protect his employer against all undue charges.

Is it not the "custom of the trade" for articles required in the building and decorating of houses to be subjected to most extraordinary discounts? Take, for instance, ornamental tiles, now so popular. They are bought by the builder subject to a discount varying from 10 to 20 per cent. Grates and mantel-pieces are subject to a discount of 20 to 33½ per cent. Wall-papers are subject to a discount of 50 per cent. Many other articles, which it is needless to enumerate, are subject to like discounts.

This being unquestionably the fact, I would venture to ask: 1. Why this extraordinary "trade custom" prevails? 2. Whether the members of your Institute are in blissful ignorance of it? 3. Whether

they, or some of them, do not certify to the correctness of a builder's account when it contains items on which these discounts are allowed, without their being deducted? 4. Whether architects do not invariably insert the names of houses where these discounts are allowed in their specifications, and insist upon the builders dealing with these houses, and whether in these cases the builder does not receive from such houses a smaller discount?

Let us assume, for the sake of argument, that the architect in no case receives any portion of these discounts directly from the houses which are in the habit of giving them. By the rules of your Institute he is permitted to receive five per cent on expenditure. If the builder is allowed to receive 50 per cent on wall-paper, besides a cash discount, it is evident that the architect receives a commission on this 50 per cent. You can hardly imagine that an employer has the remotest idea when he chooses a wall-paper — say at 12*s.*, a piece — that the cost to the builder is 6*s.* a piece, less cash discount, or that the architect who is employed to protect him is certifying to the 12*s.*, and receiving a commission not only upon the real price, but upon the artificial price.

So long as the "trade custom" prevails, so long as architects insert in their specifications the names of particular houses, instead of allowing builders to deal in the open market, I, for one, shall continue to believe that many architects take more care of themselves and of their friends than of their employers. The subject is one of considerable interest, and if you like to furnish me with any explanation of the points to which I have alluded, I shall be quite ready to give publicity to it. I do not question the desire of your Council to protect the public. What I deny is, that they succeed in doing so.

Yours obediently, THE EDITOR OF "*Truth.*"

THE ILLUSTRATIONS.

HOUSE FOR JOSEPH M. JOHNSON, ESQ., BINGHAMTON, N. Y. MESSRS. HARTWELL & RICHARDSON, ARCHITECTS, BOSTON, MASS.

THE ETHNOLOGY OF ARCHITECTURAL FORMS.

THESE very amusing and ingenious parallels are redrawn after an article by M. H. Espérandieu, published a dozen or more years since in the *Revue Générale d'Architecture*, to which we refer our readers for such information as they cannot gather from the sketches themselves.

THE RESULTS OF TESTS ON THE TRANSVERSE STRENGTH OF BEAMS, MADE AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON, MASS.

SEE succeeding article.

TRANSVERSE STRENGTH OF TIMBER.[1] — III.

THE machine with which the tests were made is a 50,000-pounds machine, and is capable of testing beams 25 feet long, as well as many of the framing-joints used in practice. It consists, as shown in the first cut (*see Illustrations*), of a compound lever hung in a cast-iron frame, to which is connected, by means of a steel rod and turn-buckle, one end of a lever, of equal arms, placed below, this lever having a 12-inch leverage, and being connected at its other end by means of a chain, with the yoke shown in the cut. Two hard-pine beams, each 20 inches deep, 10 inches wide, and 26 feet long, are laid across the timbers of the machine in such a way that the chain already referred to is midway between them. Two common jack-screws, each in a pair of wrought-iron stirrups, are placed at a distance apart depending upon the span of the beam to be tested, the latter being placed, as shown in the cut, upon the jack-screws and under the yoke. The jack-screws are then screwed up, and the beam to be tested is thus raised at its two ends, and hence loaded at the point where the yoke is attached.

The deflections are recorded to the ten-thousandth of an inch, as the measurements were made with a micrometer screw that could be read to that degree of accuracy, and hence it was thought best to give the results as they were obtained, although it is not claimed that change of temperature or other disturbing causes, which would be inappreciable as far as any practical result is concerned, may not cause so great a variation as to render it unnecessary to read to such a degree of accuracy. Moreover, I think that a perusal of the preceding summary will warrant the following conclusions in regard to beams: —

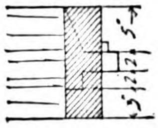
1. That the values of modulus of rupture, both for spruce and hard-pine, are much less than those commonly given in our handbooks and text-books.

2. That the values of the modulus of elasticity of spruce and hard-pine, as deduced from the immediate deflections, are somewhat less than those usually given.

3. That until we have more time tests we should use a factor of safety with the modulus of elasticity, in calculating deflections.

4. The question of beams giving way by longitudinal shearing is one that should be taken into account in practice.

TABLES OF TESTS. (*See Illustrations.*)



No. 1. — Spruce joist, 2″ x 12″, framed at ends into two pieces 4″ x 12″, 6′ 8″ apart; loaded at centre.

Tested by Messrs. Ely, Heins & Snelling.

Broke at 6304 pounds, by the joist splitting off at the tenon.

No. 2. — Spruce header, 4″ x 12″, framed at ends by double tenon and joint bolt into two pieces of 4″ x 12″; span = 6′ 8″. Mortised for four tail-beams at points 16″ on centres; load distributed at four points over the tail-beams.

Tested by Messrs. Ely, Heins & Snelling.

Broke, by splitting off at lower tenon, at a load of 10338 pounds.

No. 3. — Spruce joist, 2″ x 12″; span = 15′; loaded at centre.

Tested by Messrs. Ely, Heins & Snelling.

Loads in lbs.	Deflection in inches.	Differences.	Remarks.
591	.000		
1101	.130	.130	
1611	.258	.128	
3000	—	—	At about this point cracks at the neutral axis had opened so far that daylight could be seen through them.
5794	—	—	Left over night.
— 3652	—	—	Next morning broke upon raising load to 3650.

Calling 5794 the breaking load.

Modulus of rupture = 5432 pounds per square inch.
Modulus of elasticity = 1237215 " " " "
Maximum intensity of shear at neutral axis = 181 " " " "

No. 4. — Spruce joist, 2″ x 9″; span = 6′ 7½″; loaded at centre.

Tested by Messrs. Ely, Heins & Snelling.

Loads in lbs.	Deflection in inches.	Differences.	Remarks.
403	.0000		
597	.0121	.0121	
801	.0293	.0172	
905	.0446	.0153	
1209	.0617	.0171	
1209	.0695	.0078	After one hour.
1413	.0860	.0165	
1617	.0987	.0127	

Broke at 7227 by tension.

Modulus of rupture = 5320 pounds per square inch.
Modulus of elasticity = 1067893 " " " "
Maximum intensity of shear at neutral axis = 301 " " " "

No. 5. — Spruce joist, 2″ x 12″; 15′ span, loaded at centre; length 18′; from Bangor, Me., cut in 1881.

Tested by Messrs. Foss & Stebbins.

Broke at 5586 pounds.
Modulus of rupture = 5237 pounds per square inch.
Maximum intensity of shear at neutral axis = 174 pounds per square inch.

No. 5 *a*. — Spruce joist, 2″ x 12″; span = 7′, length 7′ 8″; loaded at centre; sawed from No. 5 after breaking, and tested in a reversed position, the upper edge being the one that was at the bottom in the previous experiment.

Tested by Messrs. Foss & Stebbins.

Broke at 8582 pounds by tension at the lower fibres after carrying the load an hour.

No. 6. — Spruce joist, 2¾″ x 9″; span = 6′ 8″; length = 9′; from Bangor, Me., cut in 1880; loaded at centre.

Tested by Messrs. Foss & Stebbins.

Loads in lbs.	Deflection in inches.	Differences.	Remarks.
586	.0000		
786	.0127	.0127	
986	.0246	.0119	
1186	.0368	.0122	
1586	.0641	.0273	
2086	.0968	.0327	
2586	.1298	.0330	
3086	.1660	.0362	
4086	.2327	.0667	
5086	.3050	.0723	
7586	—	—	Breaking load. By tension.

Modulus of rupture = 4082 pounds per square inch.
Modulus of elasticity = 938453 " " " "
Maximum intensity of shear at neutral axis = 230 " " " "

No. 7. — Spruce joist, 3″ x 9″; span = 4′; loaded at centre; from Bangor, Me., cut in 1880; very knotty and cross-grained on upper side.

Tested by Messrs. Foss & Stebbins.

Broke at 11086 pounds by tension at cross-grained fibres on lower edge.
Modulus of rupture = 3285 pounds per square inch.
Maximum intensity of shear at neutral axis = 308 pounds per square inch.

No. 8. — Spruce joist, 3″ x 9″; span = 10′; loaded at centre; from Bangor, Me., cut in 1880. Heart-wood at top, a number of diagonal

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[1] By Gaetano Lanza, Professor of Applied Mechanics, Massachusetts Institute of Technology. Continued from page 273, No. 415.

cracks in upper half of beam; knot on the side, near the bottom, running through to under side of beam, about 4″ from center.

Tested by Messrs. Foss & Stebbins.

Broke at 6086 pounds by tension, fibres parting at the knot first.
Modulus of rupture — 4508 pounds per square inch.
Maximum intensity of shear at neutral axis = 170 pounds per square inch.

No. 9. — Spruce joist, 3″ x 9″; length = 18′ 6″; loaded at centre; from Bangor, Me., cut in 1881; span = 15′; heart nearest lower edge; checked from one end to a point just beyond the centre.

Tested by Messrs. Foss & Stebbins.

Broke at 5086 pounds by tension, compression developing immediately afterwards around a knot in the upper edge.
Modulus of rupture = 5651 pounds per square inch.
Maximum intensity of shear at neutral axis = 141 pounds per square inch.

No. 10. — Spruce joist, 3⅞″ x 12″; span = 20′; length = 23′; loaded at centre; from Bangor, Me., cut in 1881; slightly checked at centre.

Tested by Messrs. Foss & Stebbins.

Broke at 6586 pounds by tension at cross-grained fibres in lower edge.
Modulus of rupture = 4253 pounds per square inch.
Maximum intensity of shear at neutral axis = 106 pounds per square inch.

No. 11. — Spruce joist, 2½″ x 13½″; span = 10′; loaded at centre; from Bangor, Me., cut in 1880; bad knot about 1′ 9″ from centre on lower edge.

Tested by Messrs. Johnson & Morrison.

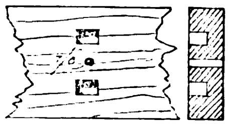
Broke at 4585 pounds by tension at knot.
Modulus of rupture = 3787 pounds per square inch.
Maximum intensity of shear at neutral axis = 208 pounds per square inch.

No. 12. — Spruce joist, 3¾″ x 12″; span = 16′; loaded 4′ 6″ from one end; from Bangor, Me., cut in 1882.

Tested by Messrs. Johnson & Morrison.

Broke at 7585 pounds by tension at cross-grained fibres on lower edge.
Modulus of rupture = 3271 pounds per square inch.
Maximum intensity of shear at neutral axis = 126 pounds per square inch.

No. 13. — Spruce joist, 3¾″ x 12″; span = 16′; mortised for header by double tenon and joint bolt at a point 4′ 6″ from one end; loaded at this point; from Bangor, Me., cut at same time as preceding; extra good stick.



Tested by Messrs. Johnson & Morrison.

Broke at 9085 pounds by tension at mortise, some compression also developing.

No. 14. — Spruce plank, 7″ broad = 2″ deep; span = 7′; loaded at centre. Cut in 1877 in Jerusalem Township, Franklin Co., Me. Tested as a plank.

Tested by Messrs. Johnson & Morrison.

Broke at 1944 pounds by crushing, and afterwards by tension. Modulus of rupture = 8748 pounds per square inch.
Maximum intensity of shear at neutral axis = 105 pounds per square inch.

THE ACTION OF FROST ON POSTS.

AT a recent meeting of the Engineers' Club, of Philadelphia, the action of frost on hydrants and other posts sunk in the ground was considered.

Mr. Allen J. Fuller presented notes upon the "Effect of Frost upon Fire-plug Casings." He referred to a general impression that the freezing of the earth around fire-hydrants has a tendency to grip fast to the frost-jacket and lift it with the expanding or heaving earth: this he denied for the following reasons: —

1. The frozen earth slides on the surface of the frost-jacket, because its expansion is greater than that of iron.

2. As the expansion of the earth must be in proportion to the intensity of the cold, so will it be greater above than below a given point, therefore, the first foot of frozen ground will have a greater upward movement than that which is below it, and the second foot greater than the third, etc. Thus it will be seen that the earth below a given point rises more slowly than that above, and its friction is opposed to the one above.

3. If this is true of feet it is true of inches, and of portions of an inch; therefore, there is a retardation of movement throughout.

4. The upward movement of the ground, the freezing being greatest towards the surface, and such movement involving a more complete fracture of the earth surrounding the frost-jacket, it follows that the friction is less at this point than that below it, and in consequence there is less power to move upward than downward.

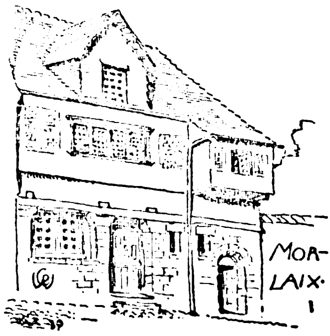
Of course the above does not apply to any construction that the frost can get beneath.

Mr. Frederic Graff noted and described the form of wooden casing which had been successfully used in the early practice of the Philadelphia Water Department.

In response to the theory advanced in regard to the action of frost in raising the casings of fire-plugs, and to the statement that if the base of a structure extended below the frost-line it would not be lifted, Professor Haupt remarked that he thought the theory was in part sustained by the fact observed by some of the district surveyors, and verified by the accurate measurements they were obliged to make, that fences moved bodily to the south and east in consequence of the action of the sun and frost upon the ground on opposite sides of them. He thought also that the deductions concerning the immobility of structures resting below the frost-line was not fully sustained by the facts, as in the Northwest, where ice forms rapidly, he had heard of numerous instances of piles, driven for bridges and extending some distance below the frost-line, having been raised as much as five to six inches in a single night, and he conceived the action in this case to be similar in kind to that of piles driven entirely through solid ground, the only difference being in the *amount* of the resistance offered by friction and weight of pile. The water in freezing around the pile acts upon it as a gripper or vise, and the expansion of the various strata or laminæ of water as they become converted into ice act as levers to force up the pile.

The Secretary did not consider the case cited by Professor Haupt as parallel, as the so-called piles being driven through water and soft mud were probably columns resting upon their bases and depending but little upon the frictional resistance of the material through which they passed. Therefore the expansive force upward of the freezing water would be opposed by little more than the weight of the pile, whereas in a fire-hydrant casing or other deeply planted post, the presumably well-rammed material around the whole length under ground would offer such proportional frictional resistance as to cause the freezing earth to slide up the post rather than to lift it. If the ice could be supposed to act downwards upon the piles in question it is hardly likely that it would have forced them further home.

LOCAL WARNINGS AGAINST TORNADOES.



IN the issue of *Science* for October 19, Professor Edward S. Holden writes: —

"I have lately examined with some care the excellent compilation by Sergeant Finley, of the Signal Service, 'Characteristics of Six Hundred Tornadoes,' with reference to the question of devising a simple apparatus for saving human life. Saving property seems to be out of the question, as no structure can withstand the force of the tornado wind. Life may be saved by recourse to underground shelters, cellars, etc., such as actually have been built in many places for this end. Two facts may be quoted from the work named: 1. Three hundred and forty-seven out of three hundred and ninety-three tornadoes (that is, eighty-eight per cent) originated between the west and south-southwest points; 2. The average velocity of progression was about one mile in two minutes. . . . If five minutes' warning could have been given at any of the late tornadoes, many lives might have been saved. If each household could be warned by the continuous ringing of a bell, for example, that a wind of destructive force (say, seventy miles per hour and upward) was approaching, and that five minutes were available in which to seek shelter, this would be well worth doing.

"I have found that it is practicable to erect, at a moderate expense (less than $500), an apparatus which would give from three to five minutes' warning to all the inhabitants of a small town, by the firing of a cannon, for instance; and in addition, and without any increased expense, this apparatus could ring a bell in every house. The additional expense to each house would be less than ten dollars, the cost of maintenance would be less than one hundred dollars a year, and the work could be done by any intelligent person. The system, for a small town, would be something like the following: Suppose a circle described about the town with a radius of from two to two and one-half miles. The only serious danger from tornadoes is to be feared from the part of this circle between the west point and south-southwest point. Along the circumference of this circle, between the south-southwest and west points, run a line of single telegraph-wire on twenty posts to the mile, and from the west point bring the wire into the town, letting it end at the telegraph-office. It is grounded at each end of the line, and at the telegraph-office it is connected with a battery, which sends a constant current over the line. Within the town, connection is made in various houses with magnets. Each magnet holds a detent, which prevents a bell from being rung by the action of a cheap clock-work governed by a coiled spring. If the circuit is broken anywhere in the line, each bell begins to ring, and continues to sound till its spring is run down, for four or five minutes, for example. A cannon could be fired by a simple device, which would warn persons in the fields, etc., to seek shelter. In a large town the circuit might end in one of the engine-houses of the fire-department, and ring a bell there. This would be the signal for the man on watch to repeat the warnings simultaneously through as many local circuits as desirable.

"It remains to indicate the way in which the circuit is to be broken by the wind. The circuit of telegraph poles from the south-southwest to the west points would contain about fifty poles. On every one of these the wire would run first to an insulator, then to an iron horizontal axis screwed into the sides of the post. On this axis a piece of board one foot square can revolve freely. An iron rod projects below this board, and from the lower end of it a small wire goes to a pin in the telegraph-pole. This pin is connected by wire to a second insulator. From this the line goes to the next pole, and so on. The circuit ordinarily passes to the first insulator, thence to the iron rod, thence down the iron rod to the thin wire, through the pin and to the second insulator, and so to the next telegraph-pole. The thin wire is a necessary part of the circuit. It is so made that it will break when the pressure of the wind on the square board is fifty pounds. The apparatus for each post is tested practically before it is set up. This can be

done at any time in a simple manner. Whenever any single one of these boards is subjected to the pressure of fifty pounds, its wire will be ruptured, and the circuit will be broken, thus sending the necessary warning along the whole line. I have made one such indicator, which is connected with a small bell in this observatory. The wire is arranged so that it breaks at a wind velocity of about ten miles per hour, and it works in a perfectly successful manner. The extension of the system for the protection of a small town is a simple matter. For a large city a more expensive system would have to be provided, as the wires between poles should be carried underground to protect them from the chance of disturbance."

MICROSCOPIC ORGANISMS IN BUILDING MATERIALS.

New York, December 2, 1883.

To the Editors of the American Architect: —

Gentlemen, — Having read with the interest of a professional microscopist, the article in your issue of August 4, on "Microscopic Organisms in Building Materials," intending at the time to furnish some additional facts from my own observations on the subject, I take the liberty, in view of the rejoinder of Mr. Goodrich in your issue of October 27, to transmit a few desultory notes that may serve to enlighten the curious reader as to the origin, classification, and real significance of the organisms described in your original memorandum, and verified by your correspondent. Mr. Goodrich will, perhaps, permit me to correct the impression conveyed in his note, that organisms possessing a spinal axis are to be found in the microscopic world. The animalcule he describes with such exactness, saving the error I have pointed out, is not properly a bacterium, as he implies when he places it among the bacilli; but a vibrio of the most familiar species, which was discovered, so far as I am acquainted with the literature of the subject, by Professor Clarke, of Harvard College, and first described and figured in his "*Mind in Nature;*" copies of which are now rather rare. The Professor was at the time pursuing a series of very interesting studies of decomposition with the assistance of a lens magnifying 3,500 diameters — a very extraordinary objective for that day — by means of which he was enabled to make out and delineate the link-shaped structure of many of the larger vibrios. The organism has since been thoroughly studied and described by microscopists, to whom it is familiar under the names of the "death" and the "decomposition" vibrio. In a series of studies of *post mortem* decomposition in animals, conducted during the session of 1877–8, in the laboratory of the New York College of Veterinary Surgeons, I found this organism to be a constant phenomenon of decomposition, requiring at a temperature of 100° Fahrenheit from thirty to thirty-six hours for its development in land animals, and from twenty-four to thirty in fishes. Under experimental conditions the initial development, requiring from twenty-four to thirty hours in land animals, and from fifteen to twenty in marine, consists in myriads of shooting monads of the average diameter of one four-thousandth of a millimetre, perfectly spherical, colorless, transparent, and apparently without limiting membrane; in a word, mere globular particles of living and germinal matter. Rod-shaped organisms (the bacilli or bacteria of microscopic observers) follow rapidly upon the development of the monads; while the third stage of decay is represented by swarms of death vibrios. By neutralizing with liquor-potassa a few ounces of fresh and healthy urine, and adding a trace of oxalic acid, swarms of the same organism may be developed under experimental conditions in a few hours; but if the oxalic acid is omitted, the decomposition is accompanied by myriads of bacilli; while the addition of a little sugar, in place of the acid, results in amorphous masses of fungous slime. The decomposition vibrio is constantly present in the pores of bricks used in the construction of cesspools, interpenetrating the whole structure; and in large cities the moisture of the soil carries thousands in every drop. It exists by millions in every saturated splinter of the timber of decaying wood-pavements, and is frequent in the damp under-surface of paving-stones. Let me give you a curious experiment, by way of showing the constancy in nature, not of the decomposition vibrio only, but of other organisms of decay. Arrange your instrument for examination; then construct a cell-slide capable of containing one minim of water, by cementing a glass circle or ring of the proper thickness to the surface of an ordinary slide. This done, cut the thinnest possible shaving from the interior of a block of perfectly dry white-pine or other timber; transfer the section to the cell, add a drop of water which has undergone the process of sterilizing; cover with a common circle of glass carefully cleaned, hermetically seal the preparation, and place it under the lens. From the instant of cutting the shaving until the first clear observation is obtained, the interval occupied need not exceed ten seconds; but short as this interval is, the field is already alive with monads, the contact of the dry and apparently dead timber with moisture having instantaneously reawakened millions of slumbering particles of living matter, which might have slept for years, possibly for centuries, had the timber been kept perfectly dry. A section of a dead leaf forms an equally interesting object for experiment; but if you put away the slide and wait for the secondary and tertiary development, the resulting organisms will not be vibrios, as in animal decomposition, but curious ovoid discs very sluggish in movement — a turtle-shaped organism with sixteen long, flexible tentacles at each end, and a bacteroid organism with dark lines of longitudinal striation, having twenty tentacles at each extremity. Forest mould after a summer rain swarms with these three microscopic forms of life; showing how Nature in her wonderful laboratory is forever engaged in economizing her vital resources, and from the decomposition of the larger visible forms wrings an equivalent in microscopic organisms for each imprisoned particle of living matter; for to the experienced microscopist, whose optical analysis has penetrated deep into the processes of nature, there is no such thing as death, in the sense of the extinction of vital activities, in that mysterious basis of tissue forms, the so-called protoplasm, or living plasma from which brain and bone, muscle and membrane of our larger life are evolved; and the body that lies so silent in its coffin, though its functional activities have ceased, still lives in myriads of microscopic lives — those universally present organisms of decay described by your correspondent, hiding themselves in the pores of brick and stone, penetrating wherever moisture can penetrate. Lying ill on one occasion, several years ago, in a room on the second story of a brownstone mansion in Twenty-eighth Street, during the winter, I became curiously interested in the drops of moisture oozing from the wall, and running down in tiny rivulets. My first work on getting so as to sit up in bed was to rig my microscope and make a study of this ooze, which proved to be loaded with vibrios of decomposition that had migrated through the brick walls, thus showing how essential to good sanitary construction it is that ample air and ventilating spaces should be left in the most solid and apparently impermeable structures.

Apologizing for having troubled you with an essay where I intended but a mere memorandum, I remain, your most obedient servant,

Francis Gerry Fairfield, Ph. D.
Prof. Histology and Microscopy, N. Y. C. V. S.

THE PEDESTAL FOR THE STATUE OF LIBERTY.

New York, December 7, 1883.

To the Editors of the American Architect: —

Gentlemen, — Whoever penned the editorial in your issue of last week in regard to the "panic that had overtaken the unfortunate Committee of the Statue of Liberty," was a well-informed man. He has made a few mistakes which, I think, should be corrected through justice to one who evidently understands the situation, and knows "how many guns" each of the General or Executive Committee can mount for service.

The Committee still have in a bank over $50,000 with which to go on and complete the foundation, but as frost has set in they will work slowly so as to be sure of its solidity. This suspension of work during frost will permit the Committee to meet, discuss and adjourn without any positive action being taken; so as to permit the general public to subscribe. This is a fascinating feature of their operations for six months past.

The concrete foundation is being made of *Rosendale* cement instead of *Portland*, because it is supposed to be slower setting and just as strong, but as a majority of the Committee have probably some general knowledge of many of the late decisions of the Berlin Society of Civil Engineers, and the information that even the English engineers have been obliged to change their formulas to conform to the German developments, you can easily appreciate the wisdom of the Committee in repudiating the action of a narrow-minded class of professionals.

You make a mistake about the granite, because the samples of what may be wanted are all on a table in the room of the Committee, and it is not the deficiency of funds that prevents the contracts being given out, but the faculty of postponing a discussion until some member of the Executive Committee can be found who will express an opinion through which they can agree, or it is ascertained that a member of the General Committee will not object.

You confound fear of responsibility with a deficiency of funds. Such an inference is unjust, and it is only fair to give them time to test the strength of the various granites, and the same consideration will be given to the quality of the granite as has been given to the cement.

You were unreasonable in placing the burden of subscription upon the owners of realty on Brooklyn Heights, because the opportunities of the residents on the ridge of Jersey highland, between Jersey City and Bayonne, were as great as those of the wealthy class on Brooklyn Heights, and you should not limit the field of subscription to the short line of residences there overlooking the bay. The statue was given to the Government of the United States, and Bedloe's Island was ceded for its exclusive use, hence it does not rest upon the New York people alone to pay all the bills.

While the deposits were light in the public boxes set out everywhere to raise money enough for a monument to Peter Cooper, and even the boxes for hospitals receive a scanty supply of daily papers, it is hardly fair to expect the Committee to make any mistake in following a fashion. It is true they are going to start a ferry between the city and Bedloe's Island, so that all who want to see the statue erected can do so by paying twenty-five cents, but this scheme was not original with the Committee. As I understand, it was suggested by an outside party, and as soon as the Executive Committee, after a lapse of a month, began to conceive what the definition of a ferry meant, they at once delegated a sub-committee to look into the merits of the idea, and generously and promptly discarded the gentleman who suggested it as a man not fitted to be considered in the general deliberations, and have turned ferry proprietors themselves! Rip Van Winkle would not believe he had been asleep for twenty years, and none of the members of the Committee on the Statue of Liberty have any idea that they are or have been asleep, until the forlorn applicant

of an idea, contract or suggestion impresses the Committee with the fact that *he* is the victim of Hendrick Hudson's spirits. The fact is, there are too many names on the Committee list.

Every monument in the land, erected to the memory of the fallen in the national conflicts of 1776, 1812, 1861–1865, bears the names of the heroes, and some who were not distinguished; hence you can understand that our Committee have an eye to a monument outside of Greenwood, where a grateful public can see the names of men who so far have subscribed some money, and now are giving their time as an offset to the public generosity. It is to be hoped that the *smaller impulses and acts* of the Committee, or whoever may influence or guide its decision, will not be recorded. It will be only fair that such of them who have "sat in grave deliberation" and given their money will not be condemned for appropriating the suggestions or advice of others as an additional subscription through the force of their active minds. Wealth has great influence here, and always justifies its position in mistaking brains for money. You can appreciate such an error of judgment, as we have no Governor Butler to investigate abuses. Respectfully, Observer.

A WATER-PROOFING FOR WALLS.

Philadelphia, December 3, 1883.

To the Editors of the American Architect: —

Gentlemen,— Accept thanks for your note of yesterday promising some memoranda in regard to the matter of earth-closets. There is another matter as to which I would be glad to have you call forth some opinions. I have of late been making some small experiments in saturating exposed stone surfaces with paraffine wax, and am partly convinced that if the surface of stone, brick and other materials, perhaps even wood after it is built up, be heated by such a hand-furnace as is used to remove old paint, and while hot is saturated with paraffine wax it will resist for a very long time the action of the weather. We have all noticed how sandstone will crumble away in less than an average lifetime, and how the lime, and even bricks, are disintegrated when exposed to the exhalations of a neighboring chimney, especially if the latter be to the north-eastward of the wall, though this is mainly applicable where hard coal is used; leading us to presume that the sulphurous acid given out forms in an easterly storm a bath of dilute sulphuric acid. I find, however, that I cannot saturate the Bedford limestone to such an extent that aquafortis will not attack it, and I find also that a certain amount of heat will evaporate the paraffine wax. The wax is not expensive, and as its name implies should be unaffected by acids or alkalies. Can you say if this material has ever been so used?

Very truly yours, C. M. Burns, Jr.

[We believe that paraffine wax is the base of the water-proofing compound manufactured by Theodore Hunt, of St. Louis, but we do not know whether in applying this preparation heat is applied to the mixture or to the building, as our correspondent suggests.— Eds. American Architect.]

MEASURING BRICKWORK.

New York, November 23, 1883.

To the Editors of the American Architect: —

Dear Sirs, — Will you kindly furnish me with the following information: being a young student I would like to get posted in estimating. How many bricks are there in an eight, twelve, sixteen, eighteen, twenty and twenty-four inch wall, also how do builders take out the quantities? By so doing you will greatly oblige a

Young Student.

[Vogdes gives the following numbers of bricks per superficial foot of wall-surface: single brick thick, 14; brick and a half, 21; two bricks, 28; two and a half bricks, 35; and seven bricks additional for each half-brick added to the thickness of the wall. Builders charge more for arches, belts, pilasters, etc , than for plain walling. Arches are measured on the outer curve, per cubic foot; pilasters, per thousand brick laid; chimneys and flues solid; belts and corbelling allow 4½" increase of thickness for each projection up to 4½", and 9" for all over 4½"; dentils solid and doubled; outside corners doubled; circular and octagonal walls per thousand; openings are measured or not as agreed on. "Student" will do well to procure and study "*Vogdes's Architects' and Builders' Pocket Companion.*" — Eds. American Architect.]

REFERRED TO OUR READERS.

Washington, D. C., December 10, 1883.

To the Editors of the American Architect: —

Dear Sirs,— Can you tell me what is the composition of fibrous plaster used in the new Adelphi Theatre, London?

Very respectfully, your obedient servant, M. C. Meigs,
Sup. Eng. and Arch., new Pension Building, Brig. Gen. U. S. A. (*retired*).

MIXING PLASTER WITH SALT.

Winona, Minn., December 3, 1883.

To the Editors of the American Architect: —

Dear Sirs,— I am about to have a house plastered, and as the weather sometimes gets rather cold here the plasterer proposes to use a little salt in his first coat. What will be the result of it? Will it make as good a job? Will the plaster fall? Will it make the walls damp?

Very truly, Junius.

[Salt in the first coat of mortar will certainly make the walls damp, and will injure paper or paint put on the plastering.— Eds. American Architect.]

THE NEW YORK CHAPTER, A. I. A.

To the Editors of the American Architect: —

Dear Sirs, —The following action took place at a regular meeting of the New York Chapter, A. I. A., held at its new office in the Bryant Building, November 14, 1883 :—

Resolved, That this Chapter desires to express its deep regret at the sudden death, on the 12th inst., of Mr. Henry Fernbach, the architect of many important buildings in this and other cities, and for many years a member of the American Institute of Architects, and Treasurer of its New York Chapter.

Resolved, That in the death of Mr. Fernbach the profession has lost an able and accomplished practitioner, the community an upright and conscientious citizen, and the members of the New York Chapter a most faithful and valued friend.

Resolved, That this society begs to offer to his widow and his family, in their affliction, its sincere condolence.

At the same meeting Mr. James E. Ware, of New York City, and Mr. Augustus Eichhorn, of Orange, N. J., were elected Practising Members, and the following officers and Standing Committees were elected for the year 1884.

President, E. H. Kendall; Vice-Presidents, Geo. B. Post and C. W. Clinton; Secretary and Treasurer, A. J. Bloor; Executive Committee: N. Le Brun, R. M. Upjohn. Committee on Examinations: N. Le Brun, R. M. Upjohn, G. B. Post. Committee on Library and Publications: H. H. Holly, W. A. Potter, Benj. Silliman, Jr. President and Secretary, members *ex officio* of these Committees.

"CONDITIONS" OF PUBLICATION OF DRAWINGS.

Buffalo, December 9, 1883.

To the Editors of the American Architect: —

Gentlemen,— Would you please let me know what is required, and what are the conditions to have buildings and plans published in your paper. You would very much oblige me in kindly answering my questions.

Yours respectfully, A. Esenwein.

[We are constantly in receipt of such inquiries as the foregoing, the writers of which having apparently given credence to the accusation which has in the past been brought against us, that only the drawings of "a certain clique and body of men" (presumably members of the American Institute of Architects) were accepted for publication. We will once more publicly state that we do not care who the man is who offers a drawing for publication, or what he has done. His offering is judged in each case strictly on its own merits. So long as the subject is not too hackneyed, the treatment artistic, and the design not too far below the average of designs already published, the drawing will stand a good chance of being accepted. Drawings are declined because of serious shortcomings in the matter of architectural design; because they are rendered so inartistically that what architectural merit they may have is destroyed, or, although they fulfil these conditions, because so many designs of a similar character and class have been recently published that it is considered best in the interest of the subscribers to discontinue temporarily publications of similar designs. Drawings are never declined because they are the offerings of Brown, Jones, or Robinson.—Eds. American Architect.]

NOTES AND CLIPPINGS.

Magnitude of the Cypress.— To give some idea of the magnitude to which some of the cypress trees attain, which are cut on the river above and brought to this market, I will state that two weeks since I surveyed a raft that came from Calhoun County (Louis Refoe), four logs of which were sawn from one tree and scaled as follows: —

36-inch diameter, 16 feet long	1,024
38-inch diameter, 16 feet long	1 156
40-inch diameter, 16 feet long	1,296
42-inch diameter, 16 feet long	1,444

making a grand total of 4,920 feet — Doyle's rule. The top log was perfectly sound, and all of the best quality of white cypress. There was not a knot visible on the surface of any of them. The lowland forests contiguous to the river and tributaries abound in similar monsters, and it only requires capital and enterprise to unlock these treasures of wealth.— *Apalachicola* (*Fla.*) *Tribune.*

Roman Ruins in Tunis.— Some remarkable ruins have been discovered in Tunis by Lieutenant Massenet, who has been dispatched on an archæological mission to the neighborhood of Bograra and El Kantara, in the Gulf of Gabes. The exact spot of the discovery is near Fabella and El Kantara, to the south of the Island of Djerba, and it is believed from the importance and extent of the ruins that they form what was once the capital of the island, many years before the Christian era. The sight is said to be most impressive. The remains of a great temple — from its form presumably dedicated to Zephyr — have been brought to light near the seashore. They are of marble, and of singular architectural richness, composed in parts of huge blocks measuring more than fifty square yards at their base. Immense columns of red and green marble form the eastern entrance, and there is a square inclosure surrounded with white marble friezes, supported by twisted columns. Numbers of statues, sculptured in Egyptian granite, were lying upon the ground, and it was remarked that, while they were all decapitated, not a single head was to be found. Another temple was discovered, about half a mile away, built of the same marble as that used in the pagan temple of El Kantara. The old fortifications of the town can still be traced, having a circumference of three or four miles, while the mosaic floors of the houses are easily visible, although much damaged by long exposure to the open air. The island was originally joined to the mainland by a causeway of Roman construction, the remains of which are even now apparent.— *London Daily Telegraph.*

"Signing" Buildings.—"In worse taste is the fashion of the architect sprawling his name conspicuously on the face of the building. This unprofessional mode of advertising—which, by the way, is by no means confined to New York—should not be allowed by the owner of the property. A more than usually conspicuously offensive tablet of this kind greets one in Boston in passing the unsightly structure of the Foreign Exhibition."—*The Art Amateur.*

It would please us greatly to have it logically explained by the writer of the above why what is permitted to and expected of the painter, sculptor, etcher, engraver, decorator and so on, is to be forbidden to that other artist—the architect.

A Re-discovery of Paintings at Antwerp.—A few years ago the administrators of the Hospices, or asylums, in Antwerp ordered all the works of art in the establishments under their direction to be sought out in order that a complete list of them might be made. A careful search was made, and from various nooks and corners forgotton pictures came to light, until now no fewer than one hundred and forty-three works by the first artists of the sixteenth and seventeenth centuries, which were probably concealed at the time the French Republican army invaded Belgium, have been collected. This unexpected addition to the art treasures of Antwerp includes pictures of great beauty by Rubens, Vandyck, Holbein, Van Erp, De Vos, Franz Hals, and other masters. About one hundred of them have been restored, and of the rest comparatively few are in a condition of hopeless ruin.

Insurance Salvage.—There were 8,751 fires reported in Massachusetts during the five years ending with 1882, and of this number 2,773 were total losses, and 5,981 were partial. The insurances on the property involved were upwards of fifty millions of dollars, and the losses paid were only about fifteen millions. This list does not include the great Haverhill fire, and there would seem to be no chance for a denial that it was better for the insurance companies that the fifty millions should have been written than to have had insurances merely to the amount of the fifteen millions destroyed. These figures show how important an element in fire insurance is salvage, though they do not show to what an extent rates would have to be raised if valued policy laws should become general. They give a hint in that direction, however, which is worth remembering.—*The Weekly Underwriter.*

Drying Lumber.—Small quantities of timber may be quickly and thoroughly seasoned by steaming. The philosophy of this process—which, if properly performed, does not injure the strength or durability of the timber—is very simple. A very large percentage of the sap in all kinds of wood is water. This water, heated to boiling, expands sixteen hundred and fifty times. It follows that if wood be heated to 212°, the boiling point of water, the capillary cells can contain only one-sixteen-hundred-and-fiftieth as much water as at ordinary temperature, the expanded water escaping as steam. The proportion of moisture left in the wood is, after steaming, less than that demanded by its ordinary hygroscopic condition. At least it is found to be so for certain species of hickory and white ash, which increased in weight after being removed from the steamer and the surfaces had become dry. The steaming should be done gradually—that is, time should be given for the wood to gradually rise in temperature, and so that the sap may escape gradually from the cells without rupturing them by its expansive force when converting them into steam. The steam should be generated in a suitable boiler, and allowed to escape at two or three pounds pressure, which should be gradually reached in proportion to the size of the pieces which it is desired to season.—*Lumber World.*

A German Fire-Department.—A correspondent of the Boston *Herald*, writing from Bayreuth, in describing a fire, says: The night I arrived I had the unexpected pleasure of seeing a comedy. It was a genuine German comedy, too. Its subject matter was the efforts of the Bayreuth fire-brigade to put out a fire. I was awakened from a sound sleep by the loud beating of a drum under my windows. I could hear drums beating in various parts of the city, the church bells were ringing, there was the heavy tramp of soldiers through the street, people rushing about and shouting "Fire,"—in fact, every indication of a fire, except the noise of fire-engines. A house a little way down the street was burning. A crowd had gathered there. I found the infantry guarding a patch of beans, the cavalry stationed about the potato patch with flashing sabres, and the artillery drawn up around a pear tree. The flames were crackling merrily among the beams. At last, around the corner appeared six big Germans carrying a small ladder, and, after them, six small Germans carrying a big ladder. These twelve Germans wore green suits and brass helmets. When they had managed to place the big ladder against the front of the house, they ran away again. After a while we heard a rattling, as though a dog with a tin can tied to his tail was running through the next street. The twelve Germans again turned the corner, drawing after them what looked like a tin box on wheels. It was the fire-engine—an open tin box with a hand-pump. A hose was attached. A fireman mounted the ladder. Another fireman carried the hose up to him. Meanwhile, women with large wooden panniers strapped to their backs brought water from the neighboring fountain and emptied it into the engine. Finally everything was ready, and the pumping began. Several large streams of water came from the joints of the hose and wet the bystanders. A small stream came from the nozzle. The fire was such a trifle that they really managed to get it pretty well under control. Then they consulted as to whether they should adjourn then and there, and get some beer, or go on until the fire was completely out. They decided to adjourn. In about an hour they came back and finished their work. I heard one Bayreuther say to another, that after all the Bayreuth fire-brigade was the best in the world. The next day the city council voted a resolution of thanks and a compensation of twelve and a half cents to the women who carried the water from the fountain to the engine. During the "Parsifal" performances the firemen are distributed through the theatre. This seems to me unnecessary; the building could burn down without their assistance.

The New Niagara Bridge.—Niagara River is at length spanned in full view of the mighty cataract by the Michigan Central's cantilever bridge. On the 11th of last April a contract was entered into. The excavations for the foundations were begun April 15. The pits for the piers were finished, and the introduction of the béton cement begun June 6. The foundations were completed June 20 on the American side and seven days later on the Canada side. The first stone for the piers on the American side was laid June 26, and on the Canada side July 13. The American piers were capped August 20, and the Canadian September 3. On August 29 the first column of steel for the tower was lowered on the American side, and on the Canada side September 10. The last section of the American tower had been laid two days previous, and on the Canadian tower it was put down September 18. On the 24th the first iron for the cantilever was run out, and both cantilevers were completed on the 17th inst. Last Tuesday a heavy beam of timber was thrown across, and the Canadian and American gangs of builders were able to clasp hands. One of them, Jack McCoy, found the temptation to be the first man to cross on the beam too strong for resistance, and over he went on a keen jump, in violation of the orders of his foreman. His eagerness to be the "first man" therefore secured for him what the workmen designate a "red ticket." In other words, he received immediate dismissal from the service of the contractors. Yesterday the work of putting in the fixed span began early, and when the hour of noon arrived the sections had been connected and the bridge practically completed. The principle of the cantilever plan is that of a trussed beam, supported at or near its centre, with the arms extending each way, and one end anchored or counter-weighted to provide for unequal loading. In practice it is entirely new, this being the only bridge completed upon the principle. The Firth of Forth bridge in Scotland, with a clear span of 1,000 feet, is being built upon this plan, and also in this country the Fraser River bridge, 315 feet clear span, on the Canadian Pacific. These are the only examples of this design yet undertaken. The total weight of the iron and steel entering into the composition of the massive structure is 3,000 tons. The bridge is of sufficient width for a double track, and is built to carry upon each track at the same time a freight train of the heaviest kind extending the entire length of the bridge, headed by two "consolidation" engines, and a side pressure of thirty pounds per square foot, which pressure is produced by a wind having a velocity of seventy-five miles per hour. Under these loads the structure is strained to only one-fifth of its ultimate strength. The total length of the bridge proper is 900 feet and nine inches, divided into two cantilevers of 895 feet on the Canadian side, and 395 feet on the American side, supported on steel towers arising from the water's edge. A fixed span of 119 feet and 9 inches is suspended from and connects the river arms of the cantilevers. The clear span across the river is 494 feet and 9 inches, being the longest double-track truss span ever yet built. The bridge spans a chasm of 859 feet from bluff to bluff. The total weight resting on each of the towers under a maximum condition of strain is in round numbers 3,200 tons. The total uplifting force that can be exerted on each of the shore arms of the cantilever is 340 tons, and the weight of each shore anchorage is 800 tons. It will be seen that every single piece of material is five times as strong as it actually need be, so that the bridge can be strained to only one-fifth of its ultimate strength.—*Buffalo Courier.*

The Gas-Companies of London.—Many years ago there were thirteen companies supplying the City of London with gas. They fought among themselves, and their mains crossed each other in all directions. Not until 1859 did they agree to confine their operations to separate districts. The number of companies began to decrease in 1869. Now there are only two companies; eleven have been absorbed by the old Gas-Light and Coke Company, and the only organization that has escaped absorption—the Commercial Company—will yield, it is predicted, in the course of time. The total capital of the Gas-Light and Coke Company is £15,500,000, and the annual dividend is eleven per cent as against a maximum dividend of ten per cent paid by the thirteen companies before amalgamation. Gas is very much cheaper to the consumer in London than it is in any city of the United States, the price being only 3*s.* 9*d.* per thousand. Some of the London papers in speaking of the growth of this great monopoly say that it is better that one company should exist instead of thirteen, because it will be easier for the corporation of London to deal with one compact monopoly than with thirteen companies when it shall become necessary to make the supplying of gas a municipal work.—*New York Times.*

The Waste of Water.—Mr. Thomas J. Bell, assistant superintendent of the Cincinnati (Ohio) Water Works, in the course of a paper written by him upon "The Wastage of Water," gives the following table as representing the daily per capita consumption of five American cities, and claims, with perfect truth, that the great increase of rate is to be charged directly to waste instead of necessity:—

Boston, per capita rate in 1850,	30 gallons;	in 1881,	92 gallons.
Brooklyn, per capita rate in 1866,	17 gallons;	in 1880,	54 gallons.
Chicago, per capita rate in 1867,	43 gallons;	in 1880,	114 gallons.
New York, per capita rate in 1867,	62 gallons;	in 1876,	100 gallons.
Philadelphia, per capita rate in 1867,	56 gallons;	in 1880,	67 gallons.
Cincinnati, per capita rate in 1845,	21 gallons;	in 1881,	87 gallons.

—*Scientific American.*

The Vitality of the Redwood Tree.—Against the final extinction of the redwood tree, even with all the reckless wastefulness which is characteristic not only in California, but of our people throughout the country, comes in a striking peculiarity, or at least a feature more strongly developed than is the case with most species. When one is cut down, the stump sends up very vigorous shoots, which grow rapidly. One—sometimes two—of these presently overpowers the others, and a thriving redwood is the result; the twins formed by two surviving shoots are not very uncommon. It thus becomes almost impossible to exterminate a redwood forest. Nothing but fire, occurring in many successive years will commonly destroy the vitality of the roots.—*Cotton, Wool and Iron.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents herementioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

289,373. FAUCET. — William J. Barr and John L. Nelson, Chicago, Ill.

289,387. VENTILATOR FOR WINDOW-SASHES. — Edward Wells Chadwick, Edgartown, Mass.

289,408. WINDOW SHADE AND SCREEN. — Elmer Green, North East, Pa.

289,411. ELECTRIC ANNUNCIATOR. — Fredrick Happersberger, Madison, Ind.

289,422. BRICK-MACHINE. — John A. Lafler, Albion, N. Y.

289,426. VENTILATOR. — Michael A. W. Louis, Washington, D. C.

289,435. DOOR-LOCK. — V. Mumford Moore, Ravenswood, Ill.

289,451. PLASTIC CEMENT MIXTURE FOR FIRE-PROOF AND OTHER STRUCTURES. — Ephraim Hyde Rust, Boston, Mass.

289,457. PARALLEL RULER. — Charles A. Shields, Washington, D. C.

289,458. SASH-BALANCE. — Gary B. Smith, Denver, Colo.

289,459. SPOKESHAVE. — Gary B. Smith, Denver, Colo.

289,463. BEVEL. — Larcy Sunderland Starrett, Athol, Mass.

289,470–471. ELECTRIC BURGLAR-ALARM. — Jas. Tomney, New York, N. Y.

289,481–482. HOT-AIR ENGINE. — Stephen Wilcox, Brooklyn, N. Y.

289,495. WATER-CLOSET AND TRAP. — Joseph Bennor, Philadelphia, Pa.

289,496. WASH-BASIN. — Joseph Bennor, Philadelphia, Pa.

289,501. TOOL-HANDLE. — Edgar Buell, Clinton, Conn.

289,502. BIT-STOCK. — Edgar Buell, Clinton, Conn.

289,506. WRENCH. — James Davison, Central City, Colo.

289,512. GRADUATED MEASURE OF LENGTH. — Samuel Darling, Providence, R. I.

289,526. WINDOW-SCREEN. — James N. Gibney, Vicksburg, Mich.

289,537. ILLUMINATING SIDEWALK OR ROOF TO A CONTINUOUS VAULT OR GALLERY, ETC. — Thaddeus Hyatt, New York, N. Y.

289,538. ILLUMINATING GRATING-TILE AND CONSTRUCTIONS MADE THEREFROM. — Thaddeus Hyatt, New York, N. Y.

289,542. LOCK. — Fredrich P. Krings, Chicago, Ill.

289,544. WINDOW-CORNICE. — Michel Linz, New York, N. Y.

289,552. ELECTRIC ANNUNCIATOR. — Augustus C. Palmer, Utica, N. Y.

289,568. FIRE-ESCAPE. — John Schmittknecht, New York, N. Y.

289,599. STRAP-HINGE. — Wm. L. Bacon, Philadelphia, Pa.

289,636. CHIMNEY-CAP. — Benjamin P. Field, Babylon, N. Y.

289,644. APPARATUS FOR ERECTING AND SUPPORTING COLOSSAL STRUCTURES. — John C. Goodridge, Jr., New York, N. Y.

289,663. COMBINED VAULT-COVER AND VENTILATOR. — T. Wesley Langill, New York, N. Y.

289,666. DOOR-CATCH. — Frederick J. Lee, Oswego, Kan.

289,697. DOOR-CHECK. — Patrick K. O'Lally, Boston, Mass.

289,701. FIRE-ESCAPE. — Samuel Webber Parker, and Henry Blackman, New York, N. Y.

289,710. SELF-ACTING FAUCET. — Anton Prier, Charles Doherty, and Pierce E. Everett, Kansas City, Mo.

289,730. FIRE-ESCAPE. — Charles W. Tillett, Fairview, O.

289,732. SASH-CORD FASTENER. — Bernhard Vogel, Baltimore, Md.

289,744. STEAM-PIPE AND BOILER COVERING. — La Fayette Aldrich, Milwaukee, Wis.

289,766. VARNISH. — Chas. M. Ely, Lexington, Ky.

289,769. BRICK-MACHINE. — William A. Graham, Carlisle, Pa.

289,772. AWNING. — Frederick Hohorst, Brooklyn, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report eighteen permits have been granted, the more important of which are the following: —

Jos. Hampson, Jr., 4 three-st'y brick dwells., e s Carey St., between Edmondson and Harlem Aves.

John Hubner, 10 two-st'y brick buildings, w s Etting St., n of Bloom St., and 9 two-st'y brick buildings, e s Etting St., n of Bloom St.

Owen McKenna, three-st'y brick building, e s McKim St., s of Chase St.

Luther M. Reynolds, 3 three st'y brick buildings, w s Chestnut St., n of Douglas St.

McCoy & Sorter, 5 three-st'y brick buildings, s w cor. McCulloh and Robert Sts.; and 4 three-st'y brick buildings, s s Robert St., in rear.

John Pfaff, three-st'y brick building, n w cor. Saratoga St. and Parrish Alley.

Louis Eckhard, two-st'y brick stable, in rear n e cor. Light St. and Fort Ave.

J. S. Rosenthal, 60 two-st'y brick buildings, e and w s Garrett Ave., between Fort Ave. and Clement St.

Jacob Saurn, 7 three-st'y brick buildings, e s Druid Hill Ave., between Gold St. and North Ave.

George Worick, two-st'y brick building, e s Aisquith St., s of Hoffmann St.

Jacob H. Taylor, 5 two-st'y brick buildings in rear of s s Mulliken St., between Broadway and Ann St.

Boston.

BUILDING PERMITS. — *Brick.—Rogers Ave.*, rear, near Ruggles St., Ward 22, for Boston & Providence R. R. Co., machine-shop, 60′ x 172′, one-st'y pitch; offices, 20′ x 40′, one-st'y flat; store-room, 20′ x 25′, one-st'y flat; blacksmith-shop, 60′ x 172′, one-st'y pitch; Geo. F. Folsom, builder.

Commonwealth Ave., Nos. 350–358, Ward 11, for Geo. Wheatland, Jr., 5 dwells., 22′ x 58′, three-st'y mansard; Vinal & Dodge, builders.

Commonwealth Ave., No. 203, Ward 11, for Leopold Morse, dwell., 26′ x 70′, four-st'y flat; J. H. Kelley, builder.

East Mt. Vernon St., Ward 9, for Albert P. Fairbanks, dwell., 22′ x 34′ 6″, three-st'y flat; J. S. Lampey, builder.

Wood. — West Sixth St., Ward 13, for James V. Devine, 4 dwells., 18′ 9″ x 32′, three-st'y flat; James V. Devine, builder.

Hamilton Ct., Main St., Ward 4, for Joseph T. Whiton, stable, 30′ and 44′ x 47′ 6″ and 17′ 6″ x 44′, three-st'y flat; Joseph W. Hill, builder.

Franklin St., near North Harvard St., Ward 25, for Frank P. Thing, stable, 34′ x 50′, one-st'y flat; Frank P. Thing, builder.

Cliff St., rear, near Glenwood St., for G. A. Brackett, carriage-shed, 18′ x 34′, two-st'y flat; G. A. Brackett, builder.

Rockland St., near Wakulla St,, Ward 21, for J. V. N. Stults and H. W. Manseed, dwell., 20′ x 40′, two-st'y pitch; John Pottov, builder.

Farrington St., near Orient Ave., Ward 1, for Lawrence Ryan, dwell., 20′ x 24′, two-st'y pitch; G. W. Adams, builder.

Bodwell Park, Ward 20, for Mortimer M. Brown, owner and builder, dwell., 22′ and 26′ x 29′ 5″, two-st'y pitch.

Unnamed Pl., off Lincoln Ave., Ward 19, for Valentine Bock, owner and builder, dwell., 25′ x 35′, three-st'y flat.

Monadnock St., Ward 20, for Mrs. Frances Knox, dwell., 14′ x 18′ and 23′ x 32′, two-st'y hip; Wm. A. Blazo, builder.

Brooklyn.

BUILDING PERMITS. — *Clay St., No.* 92, s s, 175′ e Manhattan Ave., three-st'y frame double tenement, felt and gravel roof; cost, $3,000; owner, Timothy Desmond, Dupont St., Greenpoint; builder, J. H. Murphy.

Twenty-fifth St., n s, 300′ w Fourth Ave., two-st'y frame dwell., tin roof; cost, $2,990; owner, Charles Kroneback, Twenty-fifth St., and Third Ave.; architect, F. Ryan; builders, R. Wyeth and G. W. Brandt.

Quincy St., s s, 160′ w Tompkins Ave., two-st'y and basement brick dwell, tin roof; cost, $4,000; owner and builder, Jas. W. Stewart, 435 Bedford Ave.; architect, M. Walsh.

Putnam Ave., s s, 170′ w Throop Ave., 6 three-st'y brick dwells.; cost, each, $6,000; owner, Hannah E. Stroutenburg, 187 McDonough St.; architects, Parfitt Bros.; builders, Wm. Johnston and George B. Stroutenburg.

Central Ave., e s, 50′ s Troutman St., three-st'y frame double tenement, tin roof; cost, $4,000; owner and builder, Wm. Boyer, Star St.; architect, G. Hillenbrand.

Lafayette Ave., n s, 212′ 6″ w Lewis Ave., 5 two-and-one-half-st'y brownstone front dwells., tin roofs; cost, each, $4,500; owner, architect, and builder, P. F. O'Brien, 148 Lee Ave.

Evergreen Ave., Nos. 315 *to* 319, s e cor. Harmon St., 3 two-st'y frame tenements, tin roofs; cost, each $2,600; owner and architect, Theodore J. Beir, 772 Broadway.

Chicago.

ADDITIONS. — Furst & Rudolph, architects, planned additions to factory on Ontario St., for which permit was issued to J. McGregor Adams, 74′ x 100′ for one, and 42′ x 78′ for the other, six-st'y; cost, $100,000.

DEPOT. — The largest permit of the week is that issued to the Chicago & Western Indiana Railroad Co., for a passenger-depot. This structure will be 213′ on Polk St., 446′ on Third Ave., and 185′ on Fourth Ave.; cost, $300,000.

BUILDING PERMITS. — E. Baumann, 2 two-st'y dwells., 531–533 Jackson St.; cost, $10,000; architect, E. Baumann.

Mrs. Klinger, three-st'y dwell., 3525 Wabash Ave.; cost, $5,000; architect, Fred Keltenich; builder, A. Harnowsky.

M. Tracy, 4 cottages, 1045–51 Thirty-fourth St.; cost, $4,000.

J. L. Bloomingstone, 2 two-st'y dwells., 3726–28 Ellis Ave.; cost, $10,000; architect, J. J. Flanders, builders, S. J. Moss & Co.

Chicago & West Ind. Railroad Co. passenger-depot, Polk St. and Third and Fourth Aves.; cost, $300,000; architect, C. L. W. Eidlitz.

A. E. Case, cottage, 3821-23 La Salle St.; cost, $3,000.

A. Baumann, two-st'y dwell., 184 Lewis St.; cost, $3,000.

F. R. Schell, 3 two-st'y dwells., 3218–20 Prairie Ave.; cost, $10,000; architects, Furst & Rudolph; builder, H. Appel.

Hebrew Congregation, basement, 283–285 Rush St.; cost, $15,000; architect, W. A. Arndt.

Chas. Leonhardt, three-st'y dwell., 605 Thirty-first St.; cost, $7,500; architect, P. W. Ruehl; builder, Theo. Kaiser.

Frank Mankowski, two-st'y store and dwell., 723 West Seventeenth St.; cost, $4,400.

Chas. Husche, two-st'y dwell., 739 Hoyne St.; cost, $5,000; architect, H. Clay; builder, J. Frehlich.

A. Burdt, two-st'y dwell., 502 West Chicago Ave.; cost, $4,000; architect, H. Clay; builder, William Meyme.

H. L. Thompson, five-st'y warehouse, 201–209 Michigan St.; cost, $29,000; architect, S. V. Shipman; builder, Geo, Chambers.

O. M. Wells, 3 cottages, 790–796 Tallman St.; cost, $3,000.

J. Junk, three-st'y brewery, 3708–3710 Halsted St.; cost, $12,000; architect, P. W. Wolf; builders, Swartz & Keys.

Henry Goetz, two-st'y store and dwell., 214 Lincoln Ave.; cost, $6,000; architects, Frommann & Jebsen; builder, L. Kabell.

J. McGregor Adams, six-st'y factory, 110–114 Ontario St.; cost, $100,000; architects, Furst & Rudolph; builder, T. Nicholson.

H. T. Weeks, 5 two-st'y dwells., cor. Congress and Paulina Sts.; cost, $13,000; architect, W. J. Flanders; builder, J. Gallagher.

Robert Law, two-st'y dwell., 197 Lincoln St.; cost, $5,000; architect, W. H. Thomas; builders, W. H. Thomas & Son.

New York.

"MUSEE GREVIN." — The directors of the "Musée Grevin" have appointed Mr. Theo. de Lamos, architect, for the completion of their building on Twenty-Third St., bet. Fifth and Sixth Aves., designed by the late Mr. Henry Fernbach.

THEATRES. — Plans have been filed for the theatre to be erected on the w side of Fourth Ave., bet. Eighteenth and Nineteenth Sts. The cost is to be about $150,000; Messrs. J. B. McElfatrick & Son, architects.

Preliminary plans have been made for the erection of five additional stories to Wallack's Theatre; Mr. W. H. Smith, architect.

HOUSES. — Mr. Richard Deeves will build on the n s of Eighty-second St., 175′ e of Ninth Ave., 3 four-st'y and basement houses, brick with stone trimmings, two 16′ 10″ x 50′ each, and one 16′ 4″ x 50′, to cost about $50,000: Messrs. D. & J. Jardine, architects.

Three three-st'y brick and stone houses are to be built on the e s of St. Nicholas Ave. bet. One Hundred and Forty-ninth and One Hundred and Fiftieth Sts.; from designs of Mr. Carl Pfeiffer.

On the cor. of One Hundred and Thirty-second St. and Seventh Ave., the Hon. John Kelly proposes to build a row of dwells. from designs of Mr. James Stroud.

Mr. Michael Brennan proposes to build 5 four-st'y brownstone houses on the 100′ lot on the s s of Eighty-fourth St., 175′ e of Ninth Ave.

BUILDING PERMITS. — *West Thirty-fifth St., Nos.* 147, 149, *and* 151, six-st'y brick factory, tin roof; cost, $65,000; owner; Marie L. Oliff, One Hundred and Thirtieth St. and Fifth Ave.; architect, George Ed. Harding.

East One Hundred and Twenty-seventh St., No. 169, five-st'y brick tenement, tin roof; cost, $15,000; owner, Francis Geis, 72 East One Hundred and Twenty-seventh St.; architect, Julius Boekell.

One Hundred and Thirtieth St., n s, 205′ w Seventh Ave., three-st'y brownstone front dwell., tin roof; cost, $10,000; owner, Hannah M. Halpin, 217 West One Hundred and Thirtieth St.; architect, W. J. Merritt.

Fourth Ave., w s, 53′ n Eighteenth St., three-st'y brick theatre, metal roof; owner, Kiralfy Bros., 39 Washington Sq.; architect, J. B. McElfatrick.

West Houston St., Nos. 118 *and* 120, six-st'y brick laundry-building, gravel roof; cost, $40,000; owner, Mrs, Ellen E. Ward, Roslyn, L. I.; architect, Stephen D. Hatch; builder, Robert L. Darragh & Co., and John Malloy.

Fifty-seventh St., n s, 125′ e Seventh Ave., four-st'y brick dwell., tin roof; cost, $22,000; owner, Chas. T. Wills, 462 West Eighty-first St.; architects, D. & J. Jardine; builders, Sinclair & Wills.

Fifty-seventh St., n s, 344′ e Seventh Ave., 2 four-st'y brick dwells., tin roofs; cost, $22,000 and $23,000; owners and architects, D. & J. Jardine, 1262 Broadway; builders, Sinclair & Wills.

Fifty-seventh St., n s, 182′ e Seventh Ave., 2 four-st'y brick dwells., tin roofs; cost, $23,000 and $25,000; owner, Richard Sidenberg, 54 West Fifty-second St.; architects, D. & J. Jardine; builders, Sinclair & Wills.

One Hundred and Thirty-third St., n s, 260 West Seventh Ave., three-st'y brick dwell., tin roof; cost, $15,000; owner, Chas. Kopf, 4 and 6 New Chamber St.: architect, James Barrett.

East Fifteenth St., Nos. 537, 539, 541 *and* 543, 4 five-st'y brick tenements and stores, tin roofs; cost, each, $10,000; owner, James Mulsy, 307 East Twelfth St.; architect, Fred Jenth.

East Seventy-sixth St., Nos. 102 *to* 118 *inclusive*, 13 three-st'y brownstone front dwells., tin roofs; cost, each, $14,000; owner and builder, John J. McDonald, 1532 Park Ave.; architect, Augustus Hatfield.

Eighth Ave., e s, from One Hundred and Thirty-fourth to One Hundred and Thirty-fifth Sts., 7 five-st'y brick tenements and stores, tin roofs; owner, E. H. M. Just, 689 Broadway; architect, M. C. Merritt.

Washington Pl., s s, 305′ e Monroe Ave., two-st'y frame dwell., tin roof; cost, $3,000; owner, Joseph Ducimetiere, 352 Fourth Ave.; architect, John E. Kirby.

St. Ann's Ave., e s, 150′ s Rae St., 3 two-st'y frame dwells., tin roofs: cost, each, $1,600; owner and architect, B. C. Murray, 904 Westchester Ave.

One Hundred and Sixth St., s s, 450′ e First Ave., three-st'y brick factory, gravel roof; cost, $15,000; lessees and builders, Wm. Hall Sons, 522 East Twentieth St.; architect, Burt Walther, 2255 Third Ave.

First Ave., s e cor. One Hundred and Fourth St., 4 five-st'y brick tenements and stores, tin roofs; cost, each, $12,000; owner, Wilhelmina Jush, 307 East One Hundred and Sixth St.; architect, C. V. Bielo, 2082 Second Ave.; builders, Ed. Hammer and Paul Duden.

One Hundred and Fourth St., s s, 69′ e First Ave., five-st'y brick tenement, tin roof; cost, $16,000; owner, architect and builders, same as last.

Sixth Ave., n w cor. One Hundred and Twenty-second St., four-st'y brownstone front dwell., tin roof; cost, $35,000; owner, architect, and builder, A. B. Vandusen, 26 Mount Morris Ave.

Eighty-ninth St., n s, 134′ s Fourth Ave., 2 five-st'y tenements, tin roof; cost, $21,000; owner, Wm. Henderson, 512 East Eighty-second St.; architect, J. C. Burne.

Ninetieth St., s s, 100′ w Second Ave., 4 five-st'y brick tenements, tin roofs; cost, each; $20,000; owner, Wm. Henderson, 512 East Eighty-second St.; architect, John C. Burne.

Christopher St., *No.* 167, rear, one-st'y brick workshop, gravel roof; cost, $3,500; owners, H. C. & J. H. Calkins, 256 West St.; builder, Richard Shapter.

One Hundred and Thirty-second St., n s, 150′ w Sixth Ave., three-st'y brick and brownstone front dwell., tin roof; cost, $7,000; owner, Jane Anderson, 255 West One Hundred and Twenty-second St.; architect, G. A. Schellanyer.

Avenue A, s w cor. Eighty-seventh St., 3 five-st'y brick tenements and stores, tin roofs: cost, each, $10,000; owners, Emiline Johnston and Elizabeth Johnston, 443 and 445 East Eighty-fourth St.; architect, A. B. Ogden.

Eighty-seventh St. s s, 75′ Avenue A, five-st'y brownstone front tenement, tin roof; cost, $10,000; owners and architect, same as last.

Alterations. — *Eleventh Ave.*, s e cor. Forty-second St., four-st'y brick extension and alterations to front; cost, $5,000; owner, Wm. Van Twistern, 258 West St.; architect, Julius Kastner.

Leonard St., *Nos.* 66, 68, 70 *and* 72, three-st'y brick brick and iron extension, and internal alterations; cost, $20,000; owners, Henry B. Livingston and Margaret F. Lee, Florence Flats, Fourth Ave. and Eighteenth St.; architect, Arthur Crocks.

Sixty-ninth St., s s, 25′ w Ninth Ave., one-st'y brick extension on westerly side; cost, $3,000; owner, Church of the Transfiguration, G. H. Houghton, pastor, 1 East Twenty-ninth St.; builders, W. C. Hanna, and W. Hughes.

Seventeenth St., *No.* 8, one-st'y brick extension, new store front and internal alterations; cost, $6,000; owner, Josephine H. Egan, 56 East Tenth St., carpenter, Charles W. White; mason, not selected.

Cedar St., *No.* 3, raise one-st'y and a two-st'y brick brick extension, front and rear walls to be rebuilt; cost, $5,000; owner, John H. Rhoades, Exr., 39 West Twenty-second St.; builders, A. G. Bogert & Bro.

Philadelphia.

Building Permits. — *Ruan St.*, bet. Main and Edwards Sts., (Frankford) two-st'y addition to factory, 39′ x 51′; James Bannister, owner.

Marshall St., w of Twentieth St., 3 three-st'y dwells., one, 14′ x 40′; two, 15′ x 40′; A. M. Zane, owner.

Chester Ave., cor. Forty-eighth St., three-st'y dwell., 20′ x 48′; Jas. D. Arthur, contractor.

"D" St., s of Clearfield St., two-st'y dwell., 15′ x 41′; Jno. Cunningham.

Thirteenth St., cor. of Wallace St., three-st'y store, 14′ x 26′; R. W. Robinson, contractor.

Clarkson Ave., near Duy's Lane, two-st'y stable, 24′ x 32′; Sarah L. Wistar, owner.

Front St., *No.* 913, three-st'y dwell., 15′ x 20′; H. Coulomb, contractor.

Cresson St., above Adam St., two-st'y dwell., 18′ x 32′; Thos. Haggerty, contractor.

Chancellor St., cor. Race St., bet. Thirty-second and Thirty-third Sts., 4 three-st'y dwells., 15′ x 42′; Albert Demmell, owner.

Twenty-third St., cor. Huntingdon St., two-st'y stable, 16′ x 20′: Robt. Pleis, owner.

Garfield St., bet. Main and Wakefield Sts., two-st'y dwell., 16′ x 31′; W. Garvin, contractor.

Main St., cor. Johnson St., 8 three-st'y dwells., 18′ x 45′; Jas. Sowden, owner.

COMPETITION.

COLOSSAL STATUE OF SIR W. WALLACE.

[At Aberdeen, Scotland.]

10 Bridge St., Aberdeen, October 15, 1883.

The testamentary trustees of the late Mr. John Steill, of Edinburgh, hereby notify that they will receive models for a colossal statue of Wallace, in bronze, with basement of granite blocks, to be placed on the mound in the northwest part of the Duthie Public Park, near the city of Aberdeen, in conformity with instructions left by Mr. Steill, at a cost not exceeding £3,000.

Intending competitors, on application, accompanied with a remittance of 10 *s.* 6 *d.*, to Mr. John Otto Macqueen, 10 Bridge Street, Aberdeen, will be supplied with copies of (1) Mr. Steill's instructions, (2) conditions of the competition, and (3) lithograph plan of the Duthie Park, showing sections of the mound.

The author of the accepted model will be employed to execute the work, and the author of that next in order of merit will receive a premium of £50. The trustees do not, however, bind themselves to accept any of the models.

All models must be in conformity with the above conditions, and must be delivered in Aberdeen, free of expense, addressed to Mr. J. O. Macqueen, Municipal Buildings, Aberdeen, **not later than July 1, 1884.**

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PROPOSALS.

COTTON EXCHANGE.

[At Memphis, Tenn.]

The Building Committee of the Memphis Cotton Exchange will receive sealed proposals at their office, Memphis, Tenn., **until 12 M., on the 10th day of January, 1884,** for the erection of a new cotton exchange building.

Proposals will be received in lump or in detail. All proposals in lump have to be accompanied with a good solvent bond of $10,000. Proposals for the detail work have to be accompanied with a good and solvent bond of ten per cent of cost of work.

Drawings and specifications can be seen at the Cotton Exchange in Memphis, Tenn., and at the office of H. Wolters, architect, Louisville, Ky.

The committee reserves the right to reject any or all bids.

J. M. FOWLKES,
417 Chairman Building Com.

PROPOSALS.

ELEVATORS.

[At New York City.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., December 7, 1883.

Sealed proposals will be received at this office **until 12 M., on the 21st day of December, 1883,** for furnishing and erecting two steam freight-elevators, one in the Assay Office Building and the other in Public Stores Building, corner Laight and Washington Sts., New York City, in accordance with specification, copies of which and any additional information may be had on application at this office or the office of the Superintendent of Repairs at New York City.

M. E. BELL,
417 Supervising Architect.

GLASS.

[At Charleston, W. Va.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., December 11, 1883.

Sealed proposals will be received at this office **until 12 M., on the 3d day of January, 1884,** for furnishing and delivering, ready for fixing in place, all the plate, double-thick sheet, double-thick sheet ground, and cathedral glass required for the post-office, court-house, etc., at Charleston, W. Va., in accordance with specification, schedule and diagrams, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

M. E. BELL,
417 Supervising Architect.

ELEVATED RAILROAD.

[At Pittsburgh, Pa.]

Chief Engineer's Office, Pgh. J. R. R. Co.,
Allegheny, November 25, 1883.

On and after December 1st, 1883, sealed proposals will be received at this office for the building of the iron elevated railroad, Pittsburgh Junction R. R. Co., on Thirty-third St., Pittsburgh, Pa., **until December 20th, 1883.**

Plans and specifications can be seen at office of Theodore Cooper, Consulting Engineer, No. 35 Broadway, New York city, or at office of the Chief Engineer, in P. & W. R. R. Depot, Allegheny City, Pa.

H. A. SCHWANECKE,
416 Chief Engineer P. J. R. R.

AGENCY BUILDINGS.

[At New Crow Reservation, Montana.]

Department of the Interior,
Office of Indian Affairs,
Washington, D. C., November 26, 1883.

Sealed proposals, endorsed "Proposals for Agency Buildings on the New Crow Reservation in Montana," which are to be erected about fourteen miles south of Fort Custer, near to the Custer battle-field, on the north of said field and on the west bank of the Little Big Horn, will be received at the office of the Commissioner of Indian Affairs, Washington, D. C., **until 12 o'clock, M., Wednesday, December 26, 1883.**

Complete plans and specifications of the buildings, fourteen in number, and of the work to be done, can be examined at the office of the Agent at Crow Agency, M. T., of the *Inter-Ocean*, Chicago, Ill.; *Pioneer Press*, of St. Paul, Minn.; and *Nonpareil*, Council Bluffs, Io., and at this office.

The contract to be awarded to the lowest responsible bidder or bidders, subject to the approval of the Secretary of the Interior; the right is, however, reserved to reject any and all bids, or any part of any bid, if deemed for the best interest of the service.

Proposals must be made for each building separately, as none will be received for all the buildings in a lump; and proposals must state the length of time required for the completion of each building after the approval of the contract. Time required to complete the building will be taken into consideration.

CERTIFIED CHECKS.

Every bid must be accompanied by a certified check upon some United States depository for at least five per cent of the amount of the proposal, payable to the order of the Commissioner of Indian Affairs, which check will be forfeited to the United States in case any bidder receiving an award shall fail to execute a contract with good and sufficient sureties; otherwise to be returned to the bidder.

The contract will provide for four payments, three of which will be made at such stages of the work as will fully protect the United States: the last payment will be made when the building is accepted.

H. PRICE, Commissioner.

PUMPING MACHINERY.

[At Mare Island, Cal.]

Navy Department,
Bureau of Yards and Docks,
Washington, D. C., November 12, 1883.

Sealed proposals, addressed to the Chief of the Bureau of Yards and Docks, Navy Department, Washington, D. C., endorsed "Proposals for Pumping Machinery," will be received at this Bureau by the undersigned **until 1 o'clock, P. M., of Tuesday, the 22d day of January, 1884,** at which time and place the proposals will be opened in the presence of bidders, for furnishing, delivering and erecting the pumps, engines, and other attachments pertaining thereto, for the stone dry-dock at the Mare Island Navy Yard, California, in accordance with printed instructions for the guidance of bidders.

Plans of the pump-house, pump-well, and culverts can be seen, and copies of specifications and instructions to bidders obtained, by applying to the Bureau of Yards and Docks, Navy Department; the Civil Engineer's Office at the Navy Yard, Mare Island, California; or the Navy Pay Offices at No. 17 State St., New York City; and No. 45 Milk St., Boston, Mass.

The Bureau reserves the right to reject any or all bids that may not be deemed advantageous to the Government.

No proposal will be considered unless accompanied by the prescribed bond which forms a part of the same.

EDWARD T. NICHOLS,
417 Chief of Bureau.

PROPOSALS.

WATER-WORKS.

[At Fort Smith, Ark.]

The Board of Aldermen of the city of Fort Smith, Ark., desiring to obtain a system of water-works, will grant a liberal franchise to a company willing to erect and operate the same. To that end propositions will be received up to the **first Monday in February, 1884.** For information address

ED. M. KENNA,
418 Chairman Committee on Water-Works.

GRAVING DOCK.

[At Esquimalt Harbor, British Columbia.]

Department of Public Works,
Ottawa, November 12, 1883.

Sealed tenders, addressed to the undersigned and endorsed "Tenders for Graving Dock, B. C.," will be received at this office until Friday, the 8th day of February, 1884, inclusively, for the construction and completion of the partially finished Graving Dock, at Esquimalt Harbor, British Columbia, according to plans and specifications to be seen **on and after Monday, the 24th December next,** at the Department of Public Works, Ottawa, and on application to the Hon. J. W. Trutch, Victoria, B. C.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and prices affixed to the whole of the items stated therein, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank check for the sum of $7,500 made payable to the order of the Honorable the Minister of Public Works, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the check will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
417 F. H. ENNIS, Secretary.

FLOATING GATE OR CAISSON.

[At Mare Island, Cal.]

Navy Department,
Bureau of Yards and Docks,
Washington, D. C., November 12, 1883.

Sealed proposals, addressed to the Chief of the Bureau of Yards and Docks, Navy Department, Washington, D. C., indorsed, "Proposals for Floating Gate," will be received at this Bureau by the undersigned **until 1 o'clock, P. M., of Tuesday, the 22d day of January, 1884,** at which time and place the proposals will be opened in the presence of bidders, for furnishing the necessary labor and material for the construction of a floating gate, or caisson, for the dry-dock at the Mare Island Navy Yard, California.

Plans of the floating gate, or caisson, and all attachments thereto, can be seen, and copies of specifications and instructions to bidders obtained, by applying to the Bureau of Yards and Docks, Navy Department; the Civil Engineer's Office at the Mare Island Navy Yard, California; or the Navy Pay Offices, at No. 17 State St., New York City, and No. 45 Milk St., Boston, Mass.

The Bureau reserves the right to reject any or all bids that may not be deemed advantageous to the Government.

No proposal will be considered unless accompanied by the prescribed bond which forms a part of the same.

EDWARD T. NICHOLS,
417 Chief of Bureau.

INDUSTRIAL SCHOOL.

[At Devil's Lake Agency, D. T.]

Department of the Interior,
Office of Indian Affairs,
Washington, D. C., November 23, 1883.

Sealed proposals endorsed "Proposals for the construction of an Industrial School-building at Devil's Lake Agency, D. T.," will be received at this office **until Wednesday, December 19, 1883, at 12 o'clock, M.**

Complete plans and specifications of the work can be examined at the office of the *Inter-Ocean* of Chicago, Ill.; the *Pioneer Press* of St. Paul, Minn.; the *Bismarck Tribune* of Bismarck, D. T., and at the agency.

Bids are requested for building complete, with the basement, and also without the basement, as per plans and specifications.

The contract to be awarded to the lowest responsible bidder or bidders, subject to the approval of the Secretary of the Interior; the right is, however, reserved to reject any and all bids, or any part of any bid, if deemed for the best interests of the service. Time required to complete the building will be taken into consideration, and proposals must state the length of time required for the completion of the building after the approval of the contract. Each bid must give the names of all parties interested in or parties to it, and a copy of this advertisement must be attached to bid, with post-office address.

CERTIFIED CHECKS.

Each bid must be accompanied by a certified check or draft upon some United States depository, payable to the order of the Commissioner of Indian Affairs, which check or draft shall be not less than five per cent on the amount of the bid, and shall be forfeited to the United States in case any bidder receiving an award shall fail to execute promptly a contract with good and sufficient sureties, according to the terms of his bid; otherwise to be returned to the bidder.

Bids not accompanied by a certified check or draft will not be considered.

Parties receiving awards will at once enter into contract.

The contract will provide for three payments, two of which will be made at such stages of the work as will fully protect the United States; the last payment to be made when the building is completed and accepted.

H. PRICE,
416 Commissioner.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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CONTENTS.

A NOVEL point is raised by the New York *Evening Post* in regard to the bills introduced into Congress by Mr. Belmont, repealing the duties upon works of art, and also upon "classical antiquities," the latter term being explained in the bill to mean "all articles produced before or during the mediæval period." There is no doubt that the free importation of the beautiful and sensible manufactures of the Middle Ages and of antiquity would do much to improve our own art, but, as the *Evening Post* observes, there is at present a large number of establishments in Europe devoted to the production of "mediæval articles," to say nothing of those which turn out Greek, Roman and Egyptian antiquities in such profusion; and there may be some question whether the goods sent out by these factories ought to be admitted to this country on the same terms as those which they counterfeit, or, if not, whether the average custom-house inspector would have enough knowledge of the difference between the real and the false antiquities to prevent him from being imposed upon. Even under these circumstances, however, the abolition of the duty would be beneficial, for although it may or may not be desirable to allow the French or German workman of to-day to send us his wood and metal furniture on the same terms as those under which we import those made by his ancestors, it is certain that the exclusion of all foreign furniture except that really made before the year 1500, or so nearly like it as not to be distinguishable from it, would materially improve the taste of those who look abroad for their models of such things.

AN interesting discussion is going on in some of the foreign technical journals in regard to the use of iron in connection with concrete. The defects as a building material of concrete, used alone, are well known, and the idea of counteracting its brittleness and want of tensile strength by combining it with iron is not entirely new. Some ten years ago the well-known inventor, Mr. Thaddeus Hyatt, observing that the coefficient of expansion by heat was nearly the same for Portland cement concrete as for iron, devised a method for making concrete beams, having in the lower portion, which would be subjected to a tensile strain, iron bars, armed with cross-pieces, to give them a firmer hold of the concrete. These bars supplied tensile strength just where it was wanted, and by regulating the number of bars in such a way as to make the tensile resistance of the lower half of the beam nearly equal to the resistance to crushing of the simple concrete forming the upper half, a very strong beam was formed, which would retain its qualities under the action of great heat. Various modifications of this structure were tried by Mr. Hyatt, and a most interesting pamphlet was published by him on the subject, but, for some reason, the invention does not seem to have met with success. More recently, it has been proposed to bind together masses of concrete by mixing iron wire into the soft material, as hair is added to plastering mortar to keep it from crumbling away from the laths. On the whole, the latter suggestion seems less sensible and scientific than the earlier one, and it is much to be wished that further experiments might be made upon a combination of materials which seems likely some time to be of great importance.

WE do not apologize for making frequent reference to the development of the invaluable schools for industrial instruction which are now well established in New York. Our readers have already heard of the classes in fresco-painting, wood-turning and pattern-making, which have been in operation for two years and a half at the New York Trades School. To these have been added similar classes in plumbing, bricklaying, stone-cutting and plastering. Out of the whole number of pupils, which has much more than quadrupled in two years, the largest class is that of the plumbers, who are instructed and practised in dressing pipes, making joints, and fitting up all sorts of apparatus in the best and safest manner; while the theory of drainage and ventilation is taught by regular lectures. The next class in point of numbers is that in bricklaying, which is taught in the same way, by combining practice with theory. The pupils are instructed in the properties of limes, cements and mortars, and the changes involved in slaking and setting are explained to them, the intervals of study being devoted to building piers, arches, walls and chimneys, which are afterwards torn down, the bricks cleaned, and the mortar re-tempered for further use. The class of last year was employed in constructing the building, thirty-three feet wide and seventy feet long, in which the instruction is now given, and were paid regular wages for their work; but under ordinary circumstances the pupils pay a small tuition fee, which serves to meet the actual expense of instruction and wasted materials.

EVERY few months some one announces in the newspapers, with the air of an original discoverer, that the aggregation of many patients, whether suffering from mental or bodily diseases, in the ordinary large hospitals, is more or less injurious to all of them, tending, in lunatic asylums, to keep up the abnormal mental condition, and in ordinary hospitals subjecting the patients to greater risks from infection and foul air. It is due to the architectural profession, at least, to say that there are very few members of it who do not understand this, as well as a good many other points in the construction of hospitals; but it is also true that the cost of land, construction, and maintenance for the collections of detached cottages which form the best of all hospitals is so enormous, in proportion to the number of patients to be treated in them, that only in rare instances is the necessary expenditure possible, or at least justifiable in view of all the circumstances. To take a recent instance, the noble New York Hospital, built a few years ago in the very heart of the city, with every precaution that science could suggest, and at a cost of about a million of dollars, is five stories high, and, according to some inconsiderate persons, is for that reason defective, and unworthy of imitation. Large as the cost of the building was, however, the value of land in and about Fifteenth Street is so great that an area of sufficient dimensions for a group of cottages which would contain the average number of patients treated in the hospital could not have been secured there for many times the sum appropriated to the purpose, and the only alternative would have been to remove the hospital to the upper end of Manhattan Island, where land is cheap. But this, again, would involve the transportation of most of the patients from the crowded portions of the city to the suburbs, over miles of pavements, at the risk of fatigue which would inevitably be fatal to many of them; and the choice in this case, as in hundreds of others, being between a thoroughly airy and wholesome cottage-hospital at a distance from those who would need its aid, and one less perfect in these respects, but close at hand, there can be no question that the latter was, and is, the preferable alternative. With lunatic asylums the case is different, and except for the great expense of maintenance, the cluster of small detached houses is now usually considered to be the best arrangement. Few Boards of Lunacy are, however, willing to charge the public treasury with an annual outlay, for the care of the insane in such asylums, five or six times greater than would be necessary under the old system, and this plan makes its way slowly. The authorities of Kings' County, New York, which includes the great city of Brooklyn, have the honor of being perhaps the first in this country to adopt the cottage system for a lunatic hospital on a very large scale, and one is to be built for them which will, we

hope, prove so successful as to set an example which no public body hereafter can ignore. In the new Kings' County Asylum only three or four patients are to be allotted to each house, forming little families, under the care of their own attendants, and surrounded by the best possible influences. Experience in Europe has shown the superiority of such treatment over the usual method, and the trial of it here on so large a scale will prove very interesting.

THE local journals mention the fact that a number of the best architects of Indianapolis, at the suggestion of Mr. Wallingford, a Fellow of the American Institute of Architects, met recently to consider the matter of forming a Chapter of the Institute in that city. Several applications for membership in the Institute were immediately forwarded, and the prospect for the establishment of a most active and useful association seems very good. We can say with confidence that the Indianapolis Chapter, if it should be established, would be warmly welcomed in the Institute, representing, as it would, a portion of the country where much interesting and valuable work is done, under the direction of men whose reputation has already spread far enough, notwithstanding their isolation from the rest of the professional world, to make their brethren anxious for a better acquaintance with them; and in return, the new members will probably soon have occasion to learn, with satisfaction, the value of the moral support of a large and influential professional body in cases where isolated practitioners would be nearly helpless. The general body of the Institute, or its officers, where action by the Institute as a whole was impracticable, has always shown itself ready, when called upon, to define and support the rights of members, and its aid, valuable as it has been in the past, gains in authority with every accession to its ranks.

A SINGULAR story is told by the Detroit *Free Press*, which we give for what it is worth. According to its author, the proprietors of the New York *Herald*, on the occasion of the reduction in price of their journal, had the impudence, to call it by a mild name, to paint an announcement of the change in large white letters upon the walls of Fort Lafayette, in New York Harbor. On discovering the ignominious use which had been made of the fortress in their charge, the officers in command of the post sent a peremptory order to the *Herald* managers to remove the inscription without delay. It was necessary to obey, but the stone of which the wall was built being somewhat porous, it was found that the paint had penetrated to certain depth, so that scrubbing was quite insufficient to remove it, and it was necessary to cut away the whole with chisels.

MR. WILLIAM MORRIS, perhaps the most thoughtful artist of the time, has arrived, by a different way, at a position in relation to the present theories of political economy very similar to that which Mr. Ruskin has so long occupied. Believing, as he does, that appreciation of beauty, and artistic sentiment, are among the chief sources of happiness, Mr. Morris has devoted himself to the search for some method of developing these qualities in those who need them most, the poorest of the working people; but seems to have given up the inquiry in despair, concluding that art is impossible in the present condition of the world, and will not return until monopoly and industrial competition have been abolished. The latter obstacle to general felicity has already been denounced, as most readers will remember, by Mr. Ruskin, in some of his best works, but unlike Mr. Ruskin, who contents himself with the contemplation of things as they ought not to be in the abstract, the younger reformer has taken steps toward the realization of his theories by joining a socialistic organization known as the Democratic Federation, of which he has become one of the most prominent and active members. As a sincere and intelligent man, Mr. Morris is hardly likely to do any one much harm in his attempts to carry his ideas into effect, and it will be at least interesting to observe the movements of a professed socialist, who has intelligence enough to be able to give some account of his aims and methods, and honesty enough to make his statements of fact worthy of attention.

IT is quite common in building contracts in England to insert a clause providing that "all materials shall be the property of the party of the first part as soon as they are delivered on the ground," the party of the first part being the owner of the land, and a further stipulation being sometimes added, reserving to the party of the second part the right to remove surplus materials at the completion of the building. The intention of this clause is, in case of the bankruptcy of the builder, to prevent his creditors, or the assignee for them, from laying claim to materials delivered for use in the structures which he had contracted to erect; and it has generally been held that such an agreement was valid for this purpose. A recent decision, or rather, the net result of two decisions, has confirmed this view in a particularly direct and definite manner. A certain proprietor at Tunbridge Wells made a contract, containing this clause, with a builder who afterwards went into bankruptcy. A creditor, having obtained judgment, laid claim to some bricks delivered upon the proprietor's land to be used in his buildings, and, on being confronted with the special agreement in the contract, answered that such an agreement constituted a bill of sale of the bricks, and not having been recorded as such, was void so far as he was concerned. The County Court judge held that the creditor was right, and that the agreement was, in effect, a bill of sale, but the Court of the Queen's Bench Division reversed this judgment, holding that such stipulations were not bills of sale at all, but something quite different. A second appeal is to be taken from the decision, and it may possibly be again reversed, but whatever the final result may be, this case, known as "Reeves *versus* Barlow," is likely to be the most important precedent of the kind.

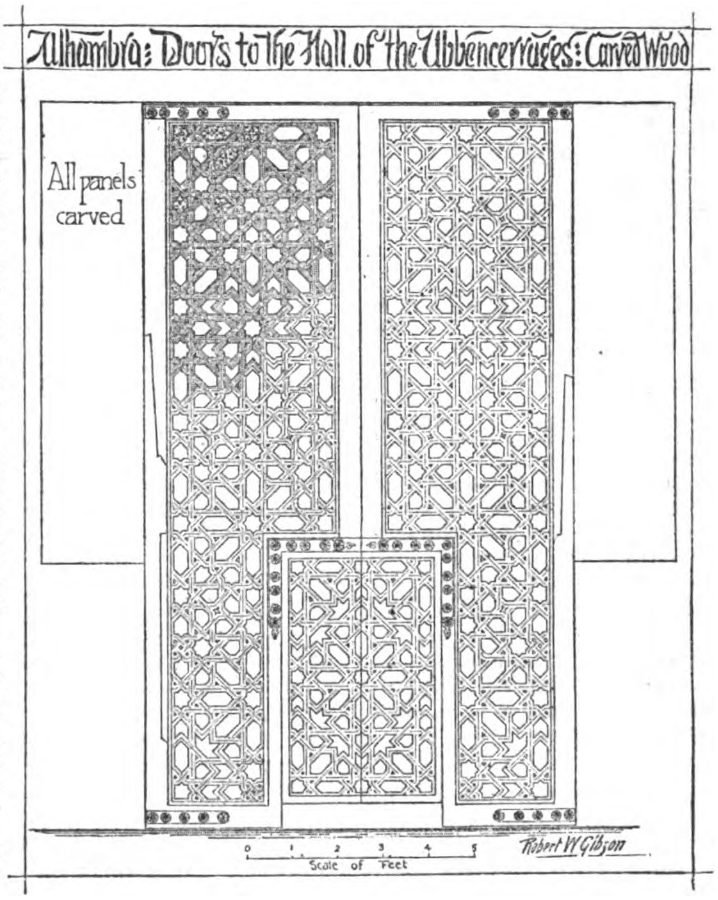
IN a letter to the *Sanitary Engineer*, General Holabird, the Quartermaster General of the United States, relates very frankly some experiences of his in ventilating traps and drain-pipes at a military station in California. "Captivated," as he says, "with the notion of purifying pipes and traps by a circulation of air," the General took occasion to fit ventilation-pipes to several kitchen grease-traps, which had been built of brick just outside the house walls, and covered with plank and clay. The return of gas from these receptacles had been intercepted in the usual way, and no offense had been noticed from them. As soon as the ventilating-pipes were applied to them, a change took place. The decomposition of animal matters, which had seemed to go on quietly in them before, was apparently made much more energetic by the increased air supply; and the odors of putrescence exhaled so abundantly from the top of the ventilating pipes that the occupants of the houses, and even their neighbors, complained, until the attempt at ventilation was abandoned, and the pipes removed. Some other experiments which had similar results, ended by bringing conviction that venting trapped wastes, so as to prevent siphonage or back-pressure, was to be sought rather than the maintenance of an abundant circulation of air through the waste-pipes. In regard to the material for such pipes, it is worth noticing that the lead drain which carried the grease from the hospital sink was continually gnawed by rats, who made holes in it, often at inaccessible points, so that the whole was at last removed, and replaced with galvanized iron.

A GOOD illustration of the French practice in regard to responsibility for fires is given in the last number of *La Semaine des Constructeurs*. It seems that several families occupied the different floors of a certain building. The inhabitant of the first story built a fire in his kitchen range, which set fire to the soot in the flue above. The chimney grew so hot that a mirror, fixed to the wall over the flue in the apartment on the next story, was cracked in several places, but no further damage was done. The correspondent of *La Semaine* wishes to know who is responsible for the injury to the mirror, the proprietor of the building having apparently done his part toward keeping the chimney in good condition by having it swept a short time before the fire. In reply the editor of *La Semaine* quotes a law of 1883, which says that "If there are several tenants, all are responsible for the consequences of a fire, in proportion to the rent of the apartment which they occupy, unless they can prove that the fire began in the apartment of one of them, in which case that one is held, and the others are free; or unless any one can prove that the fire did not originate in his apartment, in which case he is relieved." Applying this law to the occurrence in question, the editor thinks it evident that the fire originated from the kitchen range of the first-floor tenant, and infers from this that the latter will find himself obliged to pay for the mirror.

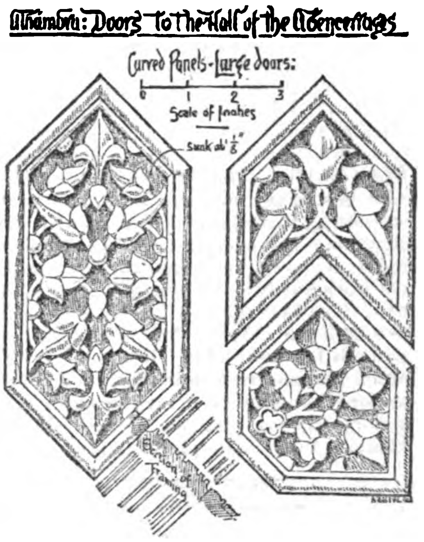
SPANISH ARCHITECTURE.[1] — VI.

GRANADA (*continued*).

THE Moorish wood-work in the Alhambra, although not prominent or abundant in the remains, is still highly interesting. Certain ceilings, including that already mentioned of the "Hall of the Embassadors," attest by their beauty of design and detail, that wood was as docile a material in the hands of the Moorish artisans as marble or plaster, and was as well understood and as greatly valued. And ancient descriptions contain abundant reference to highly prized structures of wood, chiefly cedar, decorated like the other materials with lavish skill in gold and color. It is very well ascertained that the Alhambra contained, when inhabited by its builders, works of art in this material as excellent as those we see, and as numerous as the fittings and furniture in luxurious palaces ever could be. It is difficult to imagine, and still harder to describe the richness of effect, the refinement of form, the glow of color, which pervaded one of these halls in its complete, habitable condition. Besides the ornamented walls, and ceilings, and marble floors, and fountains, which alone are so fascinating, there were doors and shutters in panelled and carved wood, lattices and screens elaborated with all the possibilities of lathe and chisel; pieces of furniture still more intricately decorated with inlays of pearl, and ivory, and metals; all these of wood. Then to continue the list, must be enumerated works of brass and silver; swinging lamps with cases and frames of filigree and pierced work, and chains of which each link was an artist's study; braziers for holding fire and burning odorous spices; stands and covers for vases, and a multitude of other articles of polished metals, all wrought into such delicate detail with hammering, and sawing, and chasing, that even a broken fragment of one is a beautiful object: then in some apartments, swords, and shields, and spears, and numberless arms of war and of the chase, all fitted by beautiful design to decorate a king's palace as appropriately as to defend his person in the field: next, resplendent objects of enamelled earthenware, great vases and tiny cups, many with mountings of precious metals: next, a profusion of articles of personal adornment, or for domestic luxury; jewels and precious crystals set in materials almost as valuable because of the labor bestowed upon them; and a wealth of color in woven fabrics, rugs, and cushions, and curtains, such as the dyes, and looms, and designs of all the world in all its ages cannot surpass, and rarely rival. Then stained-glass enriching the sunlight for the eye; the sweet smells of flowers and fruits, and of artificial perfumes for the nostrils, drifting in an atmosphere vibrating to the music of tinkling fountains, and of harmonized instruments delighting the ear, may help to complete a conception, which is far within the truth of the glories and luxuries of the palace.



It should be remembered that this catalogue of art-treasures is not imaginary except in its application; that is to say, fancy may be weaving ideal dreams and pictures in reinstating the scattered parts, and in her compositions she may be vague and poetical; but it is simple fact that the materials of the composition were such and similar marvels of art, for many of the objects exist yet; and it is plain history that these objects were gathered together in magnificent wealth within these walls, so that the imagination is only legitimately exercised to conceive what it can within these bounds. And I think that no other examples and recollections can produce in the world of art a whole more beautiful or artistic. Unity of style, and that style characterized by originality, elasticity and progressiveness, appropriate adaptability to numerous materials, and logical solution of utilitarian problems; all these qualities assist the refinement and intrinsic beauty of this Moorish work; from wall and roof to the smallest jewelled ornament. And there is one artistic principle which deserves special mention, that is, the extreme of grace and design carried into minutest details. Everything is covered with *design*. No broad surfaces "enriched" with vermiculations or meaningless spots and splashes or empty stripes, but always with intellectually conceived ornament which bears close inspection as Nature bears the microscope, revealing new beauties; and these, like Nature's, so subordinated that the greater design is undisturbed. This thoroughness which pervades all ornamented things is one of the best teachings for our age with its reckless use of unstudied elaborations.



It is indeed a pity that the Hispano-Moorish, the purest branch of Oriental design, should have been a trespasser in Western gardens, and so have been lopped off to perish full of its best blossoms. How little, after all remains, even of those things which properly come under the direction of the architect and decorator. Besides that part of the treasures which was accessory to the architectural magnificence, and which, being as beautiful elsewhere as here, was removed as salvage or spoils, a great deal that belonged strictly to the buildings has gone, especially what was constructed of wood. Time and the elements attack that material most effectually, and human despoilers found it readily separable and portable. So the doors and screens have in most instances vanished after the furnishings and gems. There is one great pair of doors, however, still hanging in their massy frames at the entrance of the "Hall of the Abencerrages" from the "Court of the Lions," which are prominent among the survivors, and these I carefully drew and measured. The ornamental interlacing lines with exquisitely carved leaf patterns in the panels between, are better described as inlaid than as panelled, as the latter word is understood in modern wood-work. The visible parts are not framed together to form a skeleton, but are pinned onto a solid, flat-framed door of wood, just as the tile dados are set upon the walls, another example of that disregard in the decoration for the true construction, which I have before noticed, and which is probably the greatest defect in the style as an architectural one. Yet, though Decoration be here divorced from her spouse, she is so beautiful in her independence that one hastens to pass the mention of it. These doors are very good examples of the method of interlacing design, differing at the outset from both of the tile patterns lately given. The vertical and horizontal positions of the leading lines are retained to fit better into the limited rectangular outline of the door, and the radiating patterns developed by them are varied from the different centres so that not a repetition, but a harmonious change is given, where a less artistic instinct would have repeated the one design. The carved work, too, is so disposed in direction of growth and shape of leaves that it falls in with, and helps the geometric idea of the grouping. It is not a mere enrichment of surface to fill so much space, and for this reason it is varied only within a certain number of changes bringing symmetry into groups to enforce

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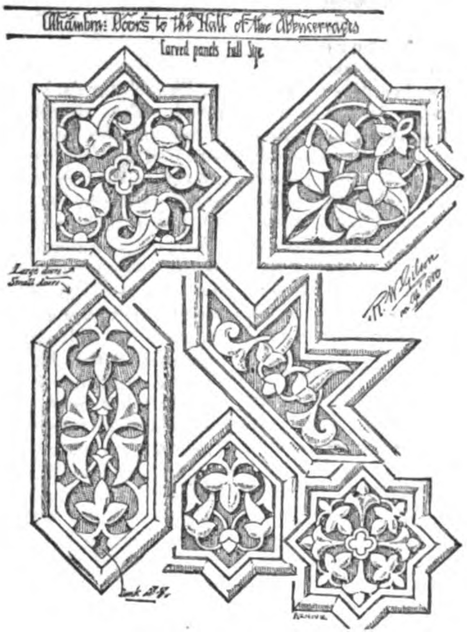
[1] By Robert W. Gibson, Travelling Student of the Royal Academy. Continued from page 269, No. 415.

their unity. The doors are three inches thick, two inches of inner constructional work, with one-half inch on each side of decorative inlay. The outer stiles and rails are, however, of full thickness. The stiles are scarf-jointed, as shown on the drawing. The small doors though designed as one, open in the middle, and the meeting stiles are full thickness with the intersecting work let in, and the panels carved on the solid. The hinges and bolts with big ornamental nail-heads are of iron. All was undoubtedly painted, although no color remains now. Indeed much of the carved and moulded work is restoration lately done, but so well done that there is no fault to be found with it. That word "restoration" has been applied in Europe to so many modes of work, and so vastly different that it is not surprising that there are many and diversified opinions about it. Anything and everything, from complete rebuilding down to botching with stucco, has been called "restoration." Sometimes all the old work has been altered, and scraped, and varnished to match the new, sometimes the new has been rubbed with dirt and washed over to match the old; so that critics and antiquarians have had just grounds for complaint. But it is only fair to say, that often, most often, perhaps, restoration has been done with tender respect for the antique, copying whenever the relics gave a model to copy, and designing without pretence of antiquity when necessary. In the Alhambra, I do not suppose anything (except perhaps some color) has been done without sure precedent. In fact, the work is rather one of repair than restoration, usually, an effort to arrest the inroads of time and weather rather than to obliterate the marks already made by them. It is entrusted to a resident conservator, who has under him a small staff of workmen (beside the guardians), to apply their labors where most required. They are only ordinarily good Spanish artisans, but from working always in the Alhambra they become so familiar with it, and the spirit of the style infuses itself so naturally into their work, that they are Moorish artisans to all purposes required of them. I have heard complaints that not enough money was devoted to this restoration, that more work, and that more thorough should be done. For my part, I am pleased to see just so much in hand as there is. If such restoration is desired as will prevent one's ability to say which is ancient, and which is restoration, then let that be done separately, let a copy of that court or this hall be devoted to experiments; but let the old venerable Alhambra be only protected and repaired. Its cracked and bending walls, and ancient and disintegrated stones and rain-roughened marbles and stuccoes, would look like the face of an enamelled old actress, if forced again into their youthful array of new paint and gilding.



Granada would be a deeply-interesting city even without the Alhambra, but this, its chief glory, so overshadows everything else that other attractive things are often neglected. Rightly or wrongly I took that common course myself, and devoted only a few grudgingly-given hours to the rest of the city.

The "Generalife" on a smaller hill near the Alhambra shows some Moorish and some Renaissance work, and is well worthy description and sketches, but I had not time. Then what picturesque "bits" of color, and light, and shade are to be found in the gypsies' village. It seems scarcely credible, yet it is bare truth that here, forming part of a European city, is a village of caves,— the queerest, dirtiest, most savage homes in Spain, excavated side by side into the steep face of the rocky hill, burrowed back deeper or shallower according to the diligence or necessities of the inhabitants, who have made their homes about as well as rabbits or rats do. They seem to be secure enough, and usually dry enough, and perhaps are better houses than the same indolent, uncultivated creatures would build on the surface of the earth; yet the first impression caused by them is blank surprise that they are there, forming a suburb of a civilized city.

Granada contains also fair "*paseos*," public promenades shaded by tall elms, and in them as in most Spanish cities those of the population who have leisure (and they are many) love to see and be seen in their best attire at the close of day. Everywhere the *paseos* are good places for the inquisitive traveller to observe the natives, and their local costumes and manners, although it must be confessed these are fast disappearing in cities which see so many strangers as Granada does. The majority of the men continue to wear the national "*capa*," but it is a tailorized garment less artistic and no more useful than the older things one may find farther north; and the women dress after French styles,— quite a little way after them it is true; there is still something essentially Spanish in their fashions; bonnets and hats are very rare; the black lace head-dress holds its own yet, and mantillas, too, are cut and worn without quite forgetting the old traditions. But after all there is not very much in the attire of these well-to-do citizens that will interest the artist as will the nondescript, threadbare, patched and darned habiliments of gypsies and beggars.

The main street of Granada was, when I was there, changing its aspect much as the inhabitants were. It is named "Calle del Darro," and the Darro, a rapid mountain stream, runs tumbling and swirling over its bed, down the centre, between rough and irregular retaining-walls and rocks, and is crossed here and there by ancient stone bridges. The buildings are in many instances picturesque and old, so the Calle del Darro is a thoroughfare not to be traversed hurriedly the first time one sees it; many a halt to look a moment at the quaint scenes, and sometimes a stumble recalling the eyes from irregular distances to nearly as irregular footways. Probably by this time I should write that all this *was* instead of is, for when I saw it masons were busy covering in the stream, and making a wide modern roadway over the arch, which will soon conceal a sewer. However, the Darro's bed was already defiled and unpleasant to look into, except when lately swept by freshets; and sanitary improvements do come at last, even in Spain.

The "Zacatin," whose name of Moorish derivation proclaims its origin and purpose (viz., street of the market), is another thoroughfare which well repays leisurely inspection. Somewhere in this neighborhood I came into a long alley, some twelve feet or so in width, a regular Moorish bazaar, a trifle too regular, perhaps, but very interesting. Horse-shoe arches upon marble columns and capitals extend along the two sides, fifteen arches on either hand, and two other branch alleys each twenty or twenty-five arches in length, open from the first. I measured and sketched some parts, and from those drawings made the sketches which head this and the two preceding chapters. Some of the detail in stucco is identical with and evidently copied from decorations in the Alhambra, and it all looked newer. I learned that the Bazaar had been burned down in 1830 and rebuilt, so doubtless it was then that the borrowing occurred. The little shops are closed with wooden doors or shutters, and the upper windows with wooden gratings and lattices. Some have glass windows, but the favorite way (at least in summer) is to open the front completely, and sell the wares from the outside, just as they do in Fez and in Bagdad. There is a much prettier effect, architecturally considered, in these arches when they stand thus unhampered by sashes and glass. The latter, especially, however transparent or however ornamental it may be, seems to me to injure very materially the expressive beauty of an arch even more than that of a colonnade; and fronts of stores and shops having pillars and girders without sashes are often seen in Spanish streets, looking very inviting, too, although they do not make such display as our northern showcases of glass and iron. There is a reality, an honesty of purpose about such fronts which, more than their novelty, I am convinced, makes them pleasant to look into.

The Renaissance Cathedral at Granada did not stimulate me to any great admiration. It is of considerable size, and has a certain dignity, but like so many others of its order it misses entirely that varied beauty which in spontaneous styles holds and leads the attention. The scholastic repetitions of pillars and arches in well-regulated rows show nothing new, nothing which is essentially their own. The whole is a worthy composition, but its parts are lifeless and unsympathetic, and so a glance is sufficient. There is no pleasure or profit in contemplating mouldings and capitals the exact like of which can be found in any of those text-books which surfeited the eye and mind in the earliest days of architectural study. Or if, as occasionally happens in this so-called Græco-Roman style, a carved capital, or a manner of fluting upon one column does attract and please, the small delight ends just there, the next capital is the same, and the next also; no refreshing little evidences of human minds and hands having worked and thought over them, pondering with loving care their purposes, and the means of expressing them— only a mechanical, pedantic rule, intellectually invented, but worn threadbare in unintellectual reproduction. This is why I cannot feel any enthusiasm in this type of the Renaissance.

I visited the Cartuja convent a little outside the city, a place of which I had heard such laudatory descriptions that my expectations ran high, but which proved to be the usual conventual medley of bad pictures and worse architecture. There is some very fine polished marble and agate, beautiful materials, but tortured into such hideous Rococo forms that it is a pity the workmen were possessed of their adroitness with the chisel to debase art so dexterously.

Notwithstanding such disappointments every ramble in this ancient city is a happy experience, for there are good things in plenty

beyond the few I have hinted at, and in such variety that doubtless every observer would select a different list for especial mention.

THE FIFTY-FOURTH ANNUAL EXHIBITION AT THE PENNSYLVANIA ACADEMY.


THE RESURRECTION. ALTO RELIEVO BY A. LANSON

TO say that the present exhibition at the Academy is better than any of its fifty-three predecessors would be the safest and most moderate kind of a statement. The only display that ever deserved to be compared with it was the one held in the Academy's galleries by the Philadelphia Society of Artists three years ago, which was, in fact, a co-operative affair undertaken by the Society and the Academy's officials working together; the former soliciting the work of artists in this country, and the latter bringing over anything which American residents in Europe wished to exhibit.

It was the first time that any institution had made a really serious effort to secure a representative exhibit from this class of workers, and the exhibition was memorable for the success which attended this effort; but the Academy has adhered ever since to the policy, which was adopted then, of authorizing the appointment by the artists themselves of European committees which should act for the Academy in accepting works offered for exhibition; all contributions accepted by such committees to be brought over at the expense of the Academy. The division which took place between the Academy and the Society about that time, and which resulted in the establishment of separate exhibitions by the artists in a gallery of their own, has undoubtedly deprived the Academy, for the last two or three years, of a good many things by the home painters which would have added much interest to its exhibitions, but the foreign contingent has, of course, been undisturbed; and the Academy has conferred distinction on its collections, and earned a great deal of credit by the course it has pursued.

One drawback, however, to the complete success of its exhibitions has been found in the custom of holding the principal exhibition of the year in the spring. This was inconvenient for the artists on the other side, who, of course, wanted the benefit of the *Salon* before sending their pictures to America, and so they were shown at a "special" exhibition, which the Academy has been accustomed to arrange in the fall, and which has by this means been made more interesting than the more regular, but often quite meagre, annual display which came in the spring. The difficulty has been obviated now by holding the annual exhibition in the fall, and as the members of the Society have grown decidedly better natured within the last year or two, and have not only contributed themselves, but allowed their friends to do so, the present exhibition is a very full and fair showing of what Americans can do in art.

The "feature" of the present exhibition, if we may be allowed to borrow a phrase from our friends in Wall Street, is the competition for prizes, of which there are several this year. Mr. Temple's offer of three thousand dollars for the best historical painting on a subject relating to the American Revolutionary period was the most important prize, and the interest is, of course, the greatest in this competition.

As far as eliciting the services of any of those artists whose co-operation was most to be desired is concerned, the result in this case is precisely what it has been in almost any one of the many competitions which recent years have witnessed, and the temptation to fall back on the critical "I told you so" is very great. But is there not something else that is worth saying, too?

The three thousand dollars would have been very well as a prize, or even as two prizes, but it was certainly too much to expect that it should also buy the picture. There can be little doubt that had it not been for the insertion of this unfortunate clause, and the stipulation that no member of the jury which was to decide on the merits of the pictures should be an artist, two or three of the half-dozen Americans who are competent to treat such a theme might really have been encouraged to do so.

As it was, four pictures were painted; three by young men in Philadelphia, and the other by Miss Sarah Dodson, a Philadelphian artist, but who is at present living in Paris.

Miss Dodson's picture is the largest and most ambitious. The subject is "The Signing of the Declaration of Independence." Mr. H. T. Cariss has painted "The Oath of Allegiance at Valley Forge," and Mr. W. T. Trego, who received the "Charles Toppan prize" of two hundred dollars for his picture of "A Battery of Light Artillery *en Route*," a year ago, is represented by the "The March to Valley Forge." Mr. Frank F. English, who has done some pretty good work as a marine painter, contributes "The Action off Flamborough Head between the *Serapis* and the *Bon Homme Richard*."

It can hardly be worth while to criticise the pictures in detail, or to discuss at any length the grounds on which the jury has made its award, but some little description of them may be of interest. Four prizes were offered. The first prize was three thousand dollars, which was also to buy the picture. The second, third and fourth were to be medals of gold, silver and bronze, respectively. The committee has decided not to award the money prize, nor the gold medal, nor the bronze medal; the silver medal is given, "Most lame and impotent conclusion!" to Mr. Trego, for the picture which is certainly about the worst of the lot, so far as any positive good qualities are concerned. Its merit is that its faults are rather less positive, too, than is the case with the other contributions. The composition is simple, but, on the whole, effective enough. Washington and an officer or two sit on their horses in a thick snow-storm beside a most forlorn-looking road, which runs straight across the picture, and along which the wretchedest of armies is marching. There is no attempt at color, and there is certainly nothing very clever or attractive about the execution, which is, throughout, of that melancholy and commonplace kind which Mr. Eakins has succeeded in making his students believe to be the proper thing in painting. There is good feeling in it, however, and it would be quite an interesting work if it were not for certain faults of drawing which are so obvious as to be quite unpardonable, and if the snow-storm were not such a very elementary affair, being, in fact, little more than a multitude of dabs of white paint distributed like spatter-work over the picture. These faults are the more surprising because the picture which won the prize last year was really a very good one indeed.

Mr. Cariss's is much more exacting as a composition, and in spite of some faults of execution which it is easy enough to point out, it is the more important work. The room has been well studied, and all the inanimate part of the picture is vigorously and freshly painted. The composition is very good, except that there is rather too much action in the principal groups, so that the picture lacks repose. The heads were evidently done in a hurry, and are the weakest part of the work. If these could be repainted, and something of the over-exertion of two or three of the most conspicuous figures restrained a little—such as that of the Baron de Kalb, for instance, who is waving a sword with his *left* hand while he rests his right on the Bible—the picture would really be a substantial addition to American historical painting, which could hardly be said of any of the others. The subject is certainly important and interesting. Mr. Cariss has represented Washington as standing and reading the oath which had been prescribed by Congress, and which he had taken himself before Lord Stirling. The four major-generals, to whom he is administering it, Stirling, Wayne, Steuben and De Kalb, are grouped about a table in the centre of the room; Hamilton is writing at a desk. Other portraits are those of aides-de-camp Tilghman and Laurens.

Miss Dodson's picture is very animated in composition, and shows a good deal of cleverness in the execution of many of the details, but it is rather loosely put together, and the canvas is too large for the figures, which are, besides, so brilliantly attired and so demonstratively vivacious in their movements as to suggest some meeting at the liveliest of French courts rather than the serious and perhaps sombre affair which we have been accustomed to think the Signing of the Declaration must have been.

Of the "Charles Toppan prizes" for the students of the Academy the first, of two hundred dollars, was not awarded, owing, it would seem, to the neglect of several of the students to state explicitly in sending in their works that they were entered for the competition, a piece of formality which the circular required, and which was doubtless inserted with good enough intentions on the part of those who prepared it, but which a disinterested outsider can hardly see any necessity for. Its insertion was unfortunate any way, for there are several very good things exhibited by students otherwise eligible, and it is a pity that somebody could not have got the prize.

The second prize has been awarded to Gabrielle D. Clements for a

very indifferent picture, "Boys Picking Berries," in which there is very little interest in either the landscape or the figures.

The "Mary Smith prize" of one hundred dollars for the best picture by a resident lady artist of Philadelphia goes a second time, and very deservedly, to Miss Emily Sartain, for her admirable "Portrait Study," a lady's head against a light-blue ground.

Although I have not given a very glowing account of the competitions for prizes I should be sorry to have it understood, therefore, that the exhibition as a whole was anything but a conspicuous success. I have already said that it is the best exhibition that the Academy has ever held, and it is.

It would be out of the question to even mention many of the works of conspicuous excellence which have been brought together here, but I cannot refrain from noticing, however imperfectly, the work of Mr. Alexander Harrison, whose half-dozen contributions from Paris are easily the most noticeable thing the exhibition has to show; this is not such a small thing to say as it might be, either, for Bridgman's "Planting Rape in Normandy" is here, and so is some of the best work that Charles Sprague Pearce has yet exhibited.

These things of Mr. Harrison's are afflicted with that sort of dusty paleness which seems to be regarded as quite the thing just now by a good many Americans who are working in Europe, and which is due to an influence for which M. Cazin is said to be mainly responsible. Whoever is responsible for it, it is an influence which is very marked at present and one which is very strikingly, and on the whole unpleasantly, apparent in any exhibition of contemporary work by artists residing abroad. It must be owned, however, that the influence is rather in the direction of refinement and spirituality than otherwise, and so is much less unwelcome than the grosser spell which some other painters whom one could name — Gérome, say, or Cabanel — are wont to exercise over almost every young artist of promise at some period of his development. Mr. Harrison, a Philadelphian by birth, and a brother of Mr. Birge Harrison, whose picture, "November," was bought by the Government at the *Salon* of 1882, began to attract the attention of judges of good work about three years ago by some remarkably crisp and fresh marines, as different as possible from the delicate and dreamy things which he sends this year. His masterpiece, so far, is the "Castles in Spain," exhibited here a year ago, and noticed in the *American Architect* at that time. Its success is not to be attributed so much to the fact that it was the first of the delicate and dreamy ones as to the felicity with which the treatment was adapted to the subject. In the pictures which are shown this year the painting is quite as good as in the other work, perhaps rather better, but the choice of subject is less happy, and the treatment less sympathetic. Still it is only with himself that Mr. Harrison is to be compared, and either of the two large pictures which he exhibits here would easily have gained him a prominent place in any display of contemporary American work. The largest of the two is called "Amateurs," and contains two figures, a boy and a girl, who are fishing from a boat in a small lily pond. The charm of the picture is in the lighting of it. It is the soft brilliance of afternoon, so soft that there is literally no shadow anywhere, and yet so bright that the whole scene fairly swims in light. It has already been purchased by the Art Institute of Chicago.

The other picture is not quite so large, but is perhaps fully as important a work. It is entitled "A Slave." Its single figure is that of a boy, the size of life, who is leaning against a wall in an agony of restraint while he waits to sell a few miserable little fishes which lie on the ground beside him. He fidgets with his feet at a battered hoop which he holds between them, and tugs aimlessly at a string with which it is wound, and one end of which he holds in his mouth. He has slipped off the *sabot* from one coarsely stockinged boot, and he clings lazily with one hand to a ring in the wall above his head. The wall is scrawled over with the hideous figures which the boyish mind takes such fiendish delight in delineating, and having exhausted the possibilities of his restricted sphere in the way of diversion, he gazes into vacancy with that longing look, the wretchedness of which cannot be matched by anything outside the class of lazy vagabonds to which, at his age, all boys belong. The pathos of it all is admirable, but it is comical too; and the pity is tempered with amusement as it usually is in the work of the masters.

Other noticeable works from Paris are Henry Mosler's "A Rainy Day," two children under a red umbrella, very quaint and pretty; Miss Emma Chadwick's "Fishermen's Chowder," a fresh and strong bit of coast scenery, with a group of fishermen cooking their dinner in the foreground; a delightful "Fantaisie," by Charles Sprague Pearce, by all odds the most brilliant piece of painting, so far as technique is concerned, in the whole display; a very charming picture by Henry Bacon, of a dairy-maid walking beside a field of young grain, and called "In Normandy;" the strongest and best of the half-marines which Mr. Frank Boggs has lately been painting so well, entitled "Boats going out with the Tide, Isigny;" several very good landscapes by G. Roger Donoho, Clifford P. Grayson, George W. Chambers,— a new man I think, — who sends a very good large picture called "The Sheperdess;" Robt. H. Monks and Kenyon Cox; and some very pretty pictures of children by Miss Ellen K. Baker.

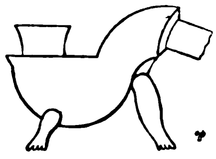
Of Bridgman's "Rape Planting," it would be an impertinence to speak, so much has been said about it already; but I must speak a word or two for a couple of pictures by young men from Boston, which have attracted the most favorable notice here from all those whose notice is worth most. One is a landscape called "The End of the Village," by Chas. H. Davis, quite as delicate and refined, and as strong, too, in its way as any of the work by Mr. Harrison to which I have already alluded, and showing, I fancy, traces of the same influence which is so marked in the case of the latter painter. Only that it is very certain that in the case of Mr. Davis it is not a question of anybody's influence to any great extent, for he has been doing work of the same exquisite kind ever since he went abroad three years ago, and even before; ever since, in fact, he began to work in the first class that was organized at the Museum of Fine Arts, in Boston, in the winter of 1876 and '77, the gentlest, most sensitive, and most talented fellow among us.

The other is a portrait, a nearly full-length by Robert W. Vonnoh, "A Portrait of Mr. C." It is a little unfortunate in the pose, and in the air of the studio which clings to it. The sitter had much better have been seated *in* his chair than astride of it, and the cigarette should have been thrown away at the door; besides, this kind of Bohemianism in the treatment invites a comparison with Chase's "Portrait of Duveneck," which everybody is familiar with, and it would have to be a wonderfully strong picture that would not suffer by such a comparison. Apart from this, the picture is a great success, and is really the most striking portrait in the exhibition; although Vinton's "William Warren" is not far off, and makes a capital impression, too. The most striking, I say, not the most beautiful, Mrs. Whitman's portrait of a little girl is that.

L. W. Miller.

SANITARY PLUMBING.[1]—XIII.

TRAPS. — GENERAL CONSIDERATIONS.



Old "Duck" or D-trap.

A TRAP is a barrier placed in the drain to shut out noxious gases. The barrier consists either of a simple body of water held in a bend of the pipe, or of a combination of a body of water and some form of mechanical closure, such as a valve, gate, or ball. A mechanical closure alone has been found insufficient to form a reliable seal. Consequently a loss of the water-seal destroys the efficiency of the trap.

Under the supposition that all traps are liable to lose their water-seal through siphonage, momentum and back-pressure, or allow of the transmission of gas-bubbles under back-pressure, unless protected by special ventilation, laws have lately been passed in many cities requiring a separate vent-pipe to be carried from the outgo of every trap into a special ventilation-duct, which shall be independent of the soil-pipe ventilator as far up as to a point above its connection with the highest fixture.

This provision in the otherwise wise and salutary plumbing-laws which have been enacted within the last year is an unfortunate one, and leads to unnecessary expense, great inconvenience, and serious danger, and will undoubtedly be repealed at an early date. At the time when it was framed, no simple and reliable self-cleansing water-trap was known, which could resist the severest tests of siphonage, momentum and back-pressure which could be applied to it. Had such a trap been known, the law would obviously never have been made. It is now believed that such a trap has been invented, and if the fact can be demonstrated, the burden entailed by this provision will no longer be endured.

The common round or "pot"-trap, though not self-cleansing, can nevertheless be made large enough to be practically proof against siphonage, and it may be periodically cleaned by hand if it is found to clog with sediment; but no trap, and least of all the S-trap, can resist the destructive effect on its seal of the rapid evaporation induced by the ventilating current required by the law. The seal is destroyed by evaporation in a very short time, varying with the rapidity and dryness of the current and the volume of water in the trap. The writer has found by repeated tests with a strong ventilating current that an ordinary one-and-one-half inch S-trap, with a two-inch dip, invariably lost its entire seal of two inches, in from four to ten days by evaporation from the outlet side alone, the house or fixture side of the trap being closed. These serious and unexpected results led to a series of careful experiments on the evaporation of the water-seal of traps, made by order of the Boston City Board of Health, the result of which will be described in detail hereafter.

Corrosion of branch pipes of moderate length by sewer-gas is never to be feared with ventilated soil-pipes. It is believed that there is no authenticated case on record of such corrosion, and no one advocates trap ventilation on this account. Indeed the induction through the branch pipes of soil-pipe air might not always be an advantage even in this direction. When the main soil-pipe is properly ventilated, the diffusion of gases, the absorptive power of water for gases, and the frequent water-flow through branch pipes afford them sufficient protection when the pipes are in use. When the pipes are *not* in use the waste matters adhering to their inner surfaces dry up, and it is believed that what decomposition then takes place goes on so slowly that its corrosive effect on the pipe is practically inappreciable.

It will be found that the ventilation of traps as required by the law adds dangers much greater than that which it pretends to remove. Besides the constant draught on the water-seal by evaporation, the vent-pipe increases the unscoured area of the trap, and, if any portion of a trap not directly scoured by water passing through it is liable to collect sediment, and ultimately clog up, then the mouth of the vent-pipe is also subject to this danger. It thus, in a measure, defeats one

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[1] **Continued from page 280, No. 416.**

of its own objects; *i. e.*, to provide a safe trap which shall be *self-cleansing, and contain no chamber or corner which shall not receive the full scour of the water* passing through the trap. Now the ventilating openings of traps have already been found, short as has been our experience with them, in cases completely closed by sediment, showing that this precaution is no certain protection against siphonage and momentum.

Add to these considerations the very important fact that the system of trap ventilation greatly complicates the plumbing and adds very largely to the number of joints required to be made tight, and very seriously to the cost of the work, and it will be understood why some of our ablest and most thoughtful sanitary engineers have so strongly condemned this law.

Short-sighted plumbers, dealers in plumbers' goods, and all those who are interested in them, or in the lead pipe in which they deal, may believe they see an advantage to themselves in the increased consumption of material and labor the law involves; and these men have ridiculed the more enlightened and disinterested opponents of the law, who have dared to put their "foot down on the vent-hole of a trap," and thus far they have been successful in keeping the law in existence; often, perhaps, in a sort of negative way by not making an honest opposition to it in accordance with their real convictions.

Traps are left in disuse and subject to the danger of loss of seal by evaporation much oftener than is generally supposed. Thus they are unused in city houses which are left unoccupied during summer; in country houses which are unoccupied during winter; in hotels and apartment-houses during the quiet seasons, or at times when they are only partly filled; in private houses in the spare chambers reserved for visitors; in business offices between the expiration and renewal of their leases; in school-houses, and all public and private office-buildings at times of vacation; in houses or chambers closed on account of the absence of their owners for travel, sickness, death or any other cause; in cases of draught, or "cut-off" of water-supply for repair of pipes, rebuilding, or other cause; in extra fixtures in houses, and in other places, and at other times which will upon reflection occur to the reader.

In a few days after a trap has thus been abandoned to the influence of the ventilating current, its seal will be destroyed by evaporation. Sewer-gas, laden with the germs more or less dangerous to human life which invariably accompany it, will escape freely into the house, impregnate the carpets, hangings, furniture, walls, and all porous substances entering into its construction, and then be ready to attack the unconscious owner upon his return.

CLASSIFICATION OF REQUIREMENTS.

The ideal trap should possess the following characteristics: —

1. It should do its work by means of a *water-seal alone.*
2. It should be *self-scouring.*
3. It should be capable of resisting the severest tests of *siphonage, momentum and back-pressure* that can ever possibly be brought to bear upon it in plumbing, and this without the aid of special ventilation.
4. It should contain a body of water large enough to be practically proof against *evaporation.*
5. It should be *simple.*
6. It should be *economical* to manufacture.
7. It should be made of *durable material.*
8. It should be so constructed that its *interior can be inspected* without removing the trap, or any part of it.
9. It should have a tight-fitting *clean-out cap*, arranged to be removed with perfect ease, and to admit of removing any foreign substance that may have lodged in any part of it.
10. All parts of its clean-out cap should be *under water*, to ensure detection of leakage if any occurred.
11. It should be so formed as to offer the *minimum of resistance* to the flow of water through it.
12. It should be independent of the fixture to which it is attached, and should be *easily connected or disconnected.*

At first thought it would seem as if some of the above requirements were incompatible or even positively antagonistic. How can a trap which is perfectly self-scouring and simple be made to resist the most powerful action of siphonage, momentum or back-pressure without the aid of some mechanical seal? It is nevertheless possible to obtain this result, and the manner in which it is done will be shown hereafter.

THE ILLUSTRATIONS.

HOUSE FOR WALTER ZINN, ESQ., DELHI, O. MR. E. ANDERSON, ARCHITECT, CINCINNATI, O.

HOUSE FOR GEORGE WRIGHT, ESQ., LONGWOOD, MASS. MR. W. A. BATES, ARCHITECT, NEW YORK, N. Y.

HOUSE NEAR PITTSBURGH, PA. MESSRS. BARTBERGER & DIETRICH, ARCHITECTS, PITTSBURGH, PA.

THE first story of this house is to be of local sandstone and brick, with terra-cotta finish, all laid in red mortar. The second story is to be of wood.

SKETCH FOR STABLE AND COACHMAN'S ROOMS. MR. H. P. KIRBY, ARCHITECT, ALLEGHENY, PA.

LECTURES ON ARCHITECTURE.[1] — VIII.

SKETCH OF THE HISTORY OF ST. PETER'S AT ROME.

THE ancient church of St. Peter had become so ruinous and dilapidated that Pope Nicholas V, a man who delighted in projecting magnificent undertakings, a lover of architecture, and one of more than ordinary genius, had conceived the project of rebuilding it, and, under the designs of Bernardo Rosellini, had actually seen a portion of the new structure rise from the ground before his death. The project seemed then to be forgotten and abandoned, until Michael Angelo, seeking a place for the erection of the mausoleum of Julius II, upon which he was then engaged, thought that the area of Rosellini's projected new church would be well suited for its reception. He accordingly proposed it to the pontiff, who was pleased with the suggestion, and sent immediately for San-Gallo and Bramante to examine into it. In these cases it has been observed that one project generally suggests another; and the rearing of a new St. Peter's accordingly became a fixed object in the mind of Julius II. He consulted with several architects upon the subject; but the fact is that the only real competition lay between San-Gallo and Bramante. The latter was the successful artist, and from a great number of designs the Pope at last chose that upon which St. Peter's was afterwards commenced; but the real design of Bramante can scarcely be traced in the present church. The changes which it was doomed to undergo before its completion were greater perhaps, than any other building of its importance was ever subjected to. When Bramante died, his designs, if indeed he left any in existence, were dispersed and lost; and we are indebted for whatever knowledge of them has come down to our time, to the diligence of Raphael, the painter, who took much pains in collecting Bramante's ideas, and preparing them as they afterwards appeared in Serlio's "*Treatise on Architecture.*" From these it is inferred that the original plan was simple, grand, and harmonious in its parts, and would doubtless, as a whole, have been far more effective than the edifice as executed by subsequent architects. It was crowned with a cupola, more like that of the Pantheon than that of St. Mary's, at Florence; so that the idea of the dome, which is currently believed to have *originated* with Michael Angelo, emanated in fact from Bramante, though the honor of carrying such a project into successful execution belongs to the former artist. It is not, however, probable that if Bramante had lived, he could have strictly executed the design which he produced. It has been clearly proved that the piers in the interior, which support the dome, would not have been sufficiently substantial for the weight to be placed on them. Bramante's cupola would have been much heavier than that executed by Michael Angelo, and it is on record that that architect considered it necessary to make his piers three time as thick as the former had ever proposed.

The general design having been adopted by Julius II, the structure was immediately commenced with a vigor and promptitude of which few but such men as Julius and Bramante were capable. One half of the ancient basilica was taken down, and on the 18th of April, in the year 1506, the first stone of the new fabric was laid by the Pope, under one of the large piers of the dome commonly called that of St. Veronica. The four piers soon rose, and the centres or scaffolding were prepared for connecting them by arches, which were actually constructed; but the weight and thrust of such massive vaults bent the piers out of the perpendicular, and cracks and fissures made their appearance in every direction. Thus, even without anything more than their own weight to support, much less that of the great cupola which was to have rested upon them, the works of Bramante threatened to fall to ruin. The great haste with which they had been raised had, without doubt, much contributed to this catastrophe. Bramante dying in the meantime, Raphael, Giocondo, and San-Gallo, and subsequently Baldassare Peruzzi were engaged on the edifice, and severally used the proper means for remedying the defects that had arisen, and for fortifying the great piers of the dome. To assist in this, as well as to push forward its proper completion, the great Michael Angelo was at length employed; and the rest of his life was chiefly devoted to carrying on the works of the huge fabric under his personal direction, and from his own original designs.

The history of the building of this church presents us with a singular instance of mismanagement. From the death of Bramante, which occurred in the year 1513, down to the year 1546, when Antonio

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[1] Extracts from a lecture by the late Mr. Arthur Gilman, delivered before the Lowell Institute, Boston, in the winter of 1844–45. Continued from page 246, No. 413.

San-Gallo died, all of the architects I have before named had been more or less extensively employed upon it; it was during this period that Bramante's original plan was so much deviated from by Peruzzi. The works are said to have become at this time the source of much jobbery, and every person that had any employment on them seemed bent only on providing for himself out of the revenues of the church. In this state of things, Michael Angelo reluctantly consented to superintend the future progress of the fabric; for it is distinctly on record that he was far from desirous of being employed.

The first use made of his authority by Michael Angelo was that of peremptorily discharging all the agents and employés of the place. A second time may the money-lenders be said to have been driven out of the temple which they profaned. That he might have more of the superiority of moral power over this worthless and venal set, he set the example of declining to receive the salary of six hundred crowns attached to his appointment. Thus he gratuitously superintended the works during a period of seventeen years, with a disinterestedness and devotion to his art, for which a parallel can scarcely be found.

In regard to his designs for the progress of the church, Michael Angelo began by undoing the whole of what his predecessor, San-Gallo, had executed. Having accomplished that object, his whole powers were directed towards carrying on the structure to such a point of advancement that no material change could possibly be made in his own plans, by the caprice of any subsequent architect. After having strengthened the great piers, vaulted over the nave, and carried up the exterior pedestal of the cupola — at the death of Pope Paul III, in the year 1549, the form of these parts of the building was unchangeably fixed; it was fortunate for the arts that he had taken this wise precaution. Under Pope Julius III, the successor of Paul, the mean intrigues which had always been carried on against our architect were vigorously renewed. He was accused of having contrived the arrangement without sufficient light, and of having changed without any reason everything which his predecessors had done. Every obstacle was thus thrown in his way which the jealousy of his disappointed rivals could effect.

But notwithstanding the severe trials he had to encounter, Michael Angelo steadily pursued his high and independent course; he felt that his own destiny and that of the fabric were identical, and notwithstanding all the unprincipled treatment to which he was exposed, he determined to stand to his post while life remained. Writing to Vasari at that time, he says, "For me to leave this place would be the cause of ruin to the Church of St. Peter, which would be a lamentable occurrence; and (on my part) a greater sin. As I hope to establish it beyond the possibility of changing the design, I could first wish to accomplish that end; if I do not already commit a crime by disappointing the many cormorants who are in daily expectation of getting rid of me." And in another letter written in reply to the pressing wishes of the Grand Duke to have him at Florence, he said, "I would prefer death to being in disgrace with the Duke. In all my affairs I have endeavored to adhere to the truth, and if I have delayed coming to Florence as I promised, the promise should have been construed with this condition, that I would not leave Rome until the fabric of St. Peter's was so far advanced as to prevent its being spoiled by others, and my design altered; nor will I leave an opportunity for those thieves to return and plunder, as has been their custom, and is still their hope. Thus placed by Divine Providence, I have exerted myself to prevent those evils; as yet, however, I have not been able to succeed in advancing the building to the point which I desire, from the want of money, and of workmen, and being old, and without any one about me to whose care I could leave the work; as I serve for the love of God, in whom is all my hope, I cannot now abandon it." It is impossible not to sympathize with the writer of such a letter as this; or to be unaffected by the simple and unbending honesty of Michael Angelo, independent, even, of all our admiration of his stupendous power as an artist.

At the advanced age of eighty-seven years, as his pedestal or tambor of the dome was then ready for the reception of the cupola, he made a small model in clay, for that important feature of the work. This model was afterwards executed in wood, under his own direction with complete accuracy; but immediate use could not be made of it at that time, because a want of funds prevented the farther progress of the building.

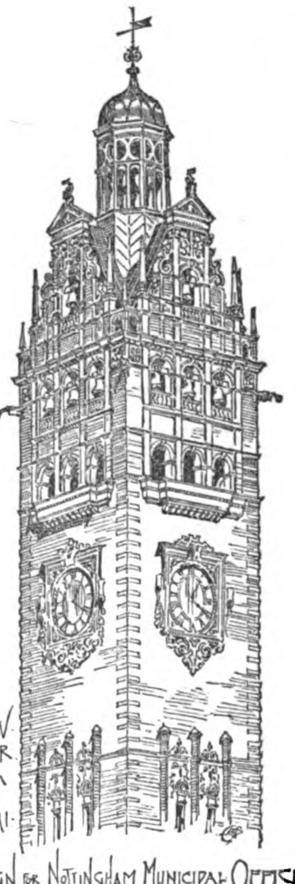
To the height of upwards of 28 feet above the exterior attic, the cupola is in one solid vault, whose diameter is nearly 139 feet at its springing, at which place its thickness is nearly 10 feet of solid stonework, exclusive of the thickness of the ribs. It then separates into two distinct vaults, one inside of the other; but as they are not concentric, the interval between them increases as they rise. At the point near the summit where they receive the lantern, they are 10 feet 7 inches apart. Thin partitions are dove-tailed into each shell to connect the two together, so that the whole is at once rendered light and firm; and it must be admitted that the construction of this dome proves the profundity of the architect's knowledge as a scientific builder to have equalled his high superiority as an architect.

After the death of Michael Angelo, which occurred in 1564, this cupola, with its lantern on the summit, was vigorously executed upon the model he had left by Jacopo della Porta, and Domenico Fontana. Thus the great artist's intentions were religiously respected in the completion of the edifice, until the time when Pirro Ligorio undertook its superintendence. This person attempting to depart from the model, and to substitute his own work instead, Pope Pius IV at once very wisely dismissed him from the situation.

I will proceed to a description of this church a little more in detail. The ground plan does not occupy a space quite equal to the Temple of Carnac in the Egyptian Thebaid; yet the Christian temple, rising in all to about six times the height of the other, gives it as a piece of construction, a very decided superiority.

The extreme length of St. Peter's is 720 feet; its breadth 510 feet; and the height from the pavement to the top of the cross, 500 feet. In the plan, the great western entrance bears some resemblance to that of the ancient Temple of Peace, also at Rome, and which has always been a favorite authority with the revived Italian school of artists, as well as with Wren, and the architects of that school in England. The entrance has seven passages into a porch 230 feet long, and 40 feet in width. The area of the nave, choir, and transepts, form a perfect Latin cross; but the space which is immediately under the dome, and encompasses the area of it, together with the body of the supporting piers, forms a square with a small circle attached to each of its angles. The whole arrangement is admirably disposed for simplicity, strength, and magnificence of effect. The side aisles, instead of extending continuously, so as to be of any consequence when viewed longitudinally, seem rather to consist of a number of distinct chapels, ranged along each side of the nave; but the whole interior of the fabric is so completely occupied by pilasters, columns, recesses, and niches, that nothing is left imperfect, and the breadth of the ground plan being so great in proportion to its length, conveys an idea of expansion and stability.

THE DUTIES OF THE ARCHITECT.[1]



TOWER FROM PREMIATED DESIGN FOR NOTTINGHAM MUNICIPAL OFFICES. ENG. F.H. OLDHAM. ARCH'T.

WHEN I had the privilege of addressing you from this chair at the opening of the session of last year, you will recollect that I directed your attention to the duties of a surveyor; this evening I propose calling your attention to some of the duties of an architect. The subject being a large one, I can only, in the time at my disposal, take a cursory view of the important and salient points in architectural practice, which will present themselves to the young architect in the development of his practice, and, if the successful professional career of any of my hearers is in any way aided by the suggestions I may make, the end and aim of this short address will be accomplished. I propose to consider — first, the mode of procuring business; second, the legal position and responsibilities of the architect. The delicate question of what is strictly professional in procuring business is, I fear, open to the interpretation which each individual practitioner may, according to his temperament and opportunities, give to it. If it is borne in mind that the measure of respect, esteem, and confidence in which the young architect is held by the client and by his professional brethren is the safest and surest indication of his future success, he will steadfastly resist every temptation to avail himself of any unprofessional advantage or gain, feeling the certainty that such temporary advantage will ultimately prove one of the greatest hindrances to his professional advancement. One source of evil is the too anxious desire to commence practice before a sufficiently sound professional knowledge is obtained to render the young architect fit to undertake the competent discharge of professional responsibilities. The student should (as I have previously urged upon you) cultivate that branch of the profession for which he feels more especially fitted; and to this end he should, after his pupilage, for a time enter into one or more offices in which this special line of practice is most fully and eminently carried out, and during which time he will (most likely) be afforded opportunity for an introduction to a practice. But what is to be the young architect's guide on entering practice? It is right and proper that your energy and ability be exerted to the uttermost to obtain some share of the professional work which you see fall into the hands of, perhaps, less able practitioners. This first season of anxious waiting will be to you (as I too well know) most trying and difficult, requiring, in no small degree, the exercise of the consoling

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[1] **Address delivered to the Birmingham Architectural Association by the President, Mr. G. J. Bateman.**

virtue of hope; but such time of waiting may, in many ways, be advantageously utilized in congenial honorary public work, in assisting architects of position, who will be glad to avail themselves of help in the special branch of the profession you have made your own. There is also competition and numerous other ways which will suggest themselves to the industrious. Nevertheless, patiently wait for legitimate opportunities for obtaining commissions, as (however few friends you may possess who are able to help you forward) such opportunities will occur. But what I wish especially to urge upon you is to make the best possible use of these legitimate opportunities when they do occur, by concentrating your whole energy, skill, and attention to this early work, from a conviction that your position in the profession will depend upon the ability, care, and thought bestowed upon it. By this means you will soon establish what is most needed — the confidence of your clients, which is the best possible mode of securing a permanent practice. However doubtful a mode of obtaining business "competition" may be,— from the too frequent miscarriage of justice, creating false hope, resulting in disappointment, mistrust, and envy, — if it be conducted on the lines laid down by the Institute it will at least afford you opportunity of proving your metal, and if the same spirit animates you as that which I have indicated should guide you in the work for your first clients it may prove, by such conscientious work, a ladder by which you may climb to distinction, as so many eminent members of the profession have so climbed before you. But let not temporary failure in competition, or any other legitimate mode of acquiring practice and position, induce you to deviate from upright and independent conduct, being ever careful to respect, by avoiding unprofessional interference with, the work of a brother architect. The accomplishment of such ends will, I believe, be furthered by unrestricted professional intercourse, which is encouraged by associations like our own; and perhaps a helping hand might more frequently be extended by the elder members of the profession to the struggling young architect. Nevertheless, you must feel no reticence in appealing to experienced brother professionals in your early trials and difficulties, as any architect worthy of the name will feel complimented by your solicitation for assistance and advice. The "legal position and professional responsibilities" of the architect are of the greatest importance in preventing misunderstanding with the client, and in avoiding the still greater evil of legal differences, as every professional legal dispute is not only disastrous to the litigant architect, but reflects upon the whole profession, for the avoidance of which it is only necessary to observe with ordinary care a few simple rules of practice; and should it ever be your misfortune to get into such troubles, instead of rushing into litigation follow the advice I have just given you, and consult some old and experienced brother professional, which will doubtless result in mediation.

I have thrown together short memoranda upon: The retainer of the architect; his responsibilities; quantities and tenders; certificates; extra works; arbitration; charges; and ownership of drawings. The young architect, in his anxiety to obtain work, is too apt to treat with indifference the client's retainer. The retainer should be a definite request, either verbal or written; if not the latter, it would be well that the retainer should be confirmed in writing, which can be readily introduced into the early correspondence; all conditional retainers should be regarded with caution, as they usually result in disappointment. A legal retainer for more than one year should be in writing, but this does not apply to engagements in building works which extend over one year. With the retainer the architect's responsibilities commence. Every architect undertakes, in the exercise of his professional duties, to bring a fair, reasonable, and competent degree of care and skill to their discharge, but he does not undertake to bring the highest possible degree of skill and judgment, yet the law requires that he shall be duly qualified to practise his profession, and he is liable for damages for negligence and unskilfulness.

Looking at the trust imposed upon the architect in his responsibility for, first, the vast amount of capital placed at his absolute disposal; second, the terrible (and generally fatal) consequence of failure from imperfect construction in design or in the execution of a structure; third, the lasting nature of the monument to his honor or to his disgrace which his buildings perpetuate — from these considerations you must feel the importance and gravity of your responsibilities, and the absolute necessity for their conscientious and competent discharge; and I would further add that the ill-devised, inconvenient, or inappropriate nature of your design, entailing upon the proprietor or building owner annoyance and loss, involves you, if not in legal responsibilities, in the serious charge of incompetence. If by faulty or insecure construction a calamity should occur (if not fatal) endangering life, it will remain a stigma upon your professional reputation through life. The crude deformity of a building from inartistic and unarchitectural design is a standing record of the incapacity of the architect instead of a contribution to "architecture," which provides for the convenience and the magnificence of nations, and gives to them the lustre and prosperity which true civilization implies.

Quantities and tenders must be considered together, the former being the means of procuring the latter. The question of quantities having for so many years agitated the profession, a review of "professional practice" would be incomplete without some notice of it. In the early days of my practice quantities were unknown, as each builder made his own measurements and calculations, or employed a surveyor to do so; but the growth of competition rendered the continuance of such a course impracticable, not only from the time it would occupy to procure tenders, but the expense and trouble entailed upon each competing contractor, which have brought about the present custom of quantities in procuring tenders. And this practice we must accept, it having obtained legal recognition; therefore, we have only to consider the best mode of procuring and making use of them. Exhaustive discussions have practically narrowed the issues to this: "Should the architect take out the quantities for his own work, or should they be taken out by an independent surveyor?" The strong view which was taken by the Institute against the provincial practice of the architect being the quantity-taker has been considerably modified in consequence of the concurrent testimony of provincial architects of eminence in support of the practice, although in London the quantity-surveyor continues to take them out. The advocates of the architect taking out his own quantities say: "If they are taken out by the surveyor, his responsibility to the builder for errors of omission is sufficient inducement to the surveyor (for his own protection) to take out his dimensions full;" also, "that from the advance in the science of quantity taking, the minute admeasurements and multiplication of items of the minor detail of the work (extending to many folios of the quantities) convey to the builder an exaggerated description of the works, and that this minute detail creates considerable difficulty in arriving at a just estimate of extra and omitted works at the completion of the contract, and often tends to increase the amount of extra works."

Now, whatever force there may be in these arguments, I do not propose to adopt them as a reflection upon an educated and high-minded class of professional men, but raise the question on the simple ground of fitness and appropriateness of the provincial practice of architects measuring their own quantities. It is urged that the architect's duty extends only to the preparation of the necessary plans and specification for the proposed work; but with the preparation of the estimate or tender he has nothing legitimately to do. In reply, I think it the architect's duty to protect the building owner, and also to see ample justice done to the builder. It is, therefore, the province of the architect to see that the basis on which the tender is made is equitable both to employer and employed. It must be assumed that the architect knows more of the details of his plans than any one else, and by measuring up every portion of the works for quantities, such a minute review of every detail of construction enables him to prepare much more accurate specifications and working-drawings than he would do by delegating the quantity-measuring to other hands. The architect being the agent of the building owner, the builder might fairly ask, for his protection, that the quantities should form part of the contract. To this I shall presently refer. It is the duty of the architect, under the usual building contract, to ascertain the amount of extra and omitted works, and if he prepares the quantities on which the contract is made up, he is better prepared to perform his duty. Now, if the quantity-surveyor is employed, the preparation of the specification and the measuring up of the extra works would be more properly performed by the surveyor instead of the architect. It may be said that if the quantities become part of the contract, it becomes less material who prepares them so that the tender shall represent as nearly as possible the cost of the buildings; for such purpose I contend that the architect is as competent as the surveyor to perform the work.

An argument against the quantities forming part of the contract is that the builder's estimate is not a tender for the execution and completion of the buildings as shown on the plans, but is an estimate only for the works described and included in the bills of quantities; but no injustice is done to the building owner if he pays for such work only as is erected in the building by the contractor, whether it be included in the bills of quantities or not, and it is the duty of the architect in measuring up the extra work to ascertain and determine this, and it is much more just and equitable for the building owner to be called upon to pay for any works omitted from the quantities, than that the quantity-surveyor should be held responsible to pay for works done for the building owner.

Lastly, as to the payment for quantities: they are in all cases paid for by the building owner, the charge is included in the builder's tender, and if the building owner is made aware of this fact this course is not objectionable. Excepting in large contracts, when the charges for quantities are considerable, they should be paid directly to the architect by the building owner, as, if they are added to the builder's estimate, commission is paid to the architect upon the amount of these charges. In many instances when the quantity-surveyor has been employed, the architect has taken a share of his charges, but this is illegal, and the Institute having issued the following minute: "That such practice is deemed conduct which, in the opinion of the Council, is derogatory to the professional character," will be sufficient to prevent the continuation of the practice. I would say, in concluding this somewhat long notice of this subject, that the income of the architect being considerably affected by the preparation of quantities (although a low ground on which to justify the practice), the work is one which (you will agree with me) the provincial architect is not in a position to give up without good and sufficient reason.

The "architect's certificate" is one of the important documents with which you will have to deal. The issue of a certificate is final and binding upon both the building owner and contractor, and there is no more certain way of breaking a contract than for

the building owner to refuse to honor a certificate. Therefore, the architect accepts the full responsibility of any error in the certificate he issues; consequently great caution is necessary, more especially as to the final certificate at the conclusion of the works, which determines the final balance of amount due in discharge of the contract, and which the contractor or building owner can only open by arbitration (to which I shall presently refer). Except in case of fraud, no architect's certificate can be ignored or set aside, showing the great importance of the document and the consequent responsibility attached to certificates.

"Extra works" is a subject on which the solicitude of the young architect cannot be too anxiously directed, as, if there is one subject more than another on which the client is likely to raise an issue with his architect it is "extra works," more professional dissatisfaction having been caused by inattention to the insidious accumulation of extras than by any other cause. One precaution against "unexpected" extras is for the architect to prepare his own quantities, by which there would be less probability of omitting from the specification any portion of the necessary works which are usually discovered at the completion of the contract. Extras will necessarily arise from alterations made by the building owner during the progress of the works, for which it is advisable to have definite estimates; and if this is not practicable from the nature of the work, weekly statements should be kept of the time and materials, which should be frequently laid before the building owner, in order that he may be made acquainted during the progress of the work of the increased amount of expenditure. The clause in building contracts requiring that "written orders must be given for extras" should be scrupulously observed, as it brings before the architect and building owner the extras before they are executed. I may add that it has been legally held that drawings do not constitute an order for extras, although I think this decision would, in many cases, be subject to revision. The architect being paid by commission on the amount of expenditure, any large and unexpected increase in the cost of the buildings exposes the architect to the suspicion of the building owner that self-interest may have something to do with such increased outlay. In cases when buildings are erected on speculation or for investment, the increased cost very seriously affects the building owner. Thus the "pernicious extra" causes dissatisfaction and frequently alienates the confidence of the client, to the serious prejudice of the architect. It is, I trust, unnecessary for me to remind you of the illegality of an architect participating directly or indirectly in the profits arising from the works on which he is employed; all such surreptitious dealing entitles the building owner to full redress, and all contracts influenced by fraudulent gifts or commissions are void.

Until a comparatively recent date, the architect was universally constituted the sole arbitrator in the building contract, and from whose decision there was no appeal; but there are now few respectable contractors who will sign contracts which do not contain the arbitration clause, which gives a power of appeal against the architect's decision upon all matters except the perfection of the work, of which he is the sole judge and over which he retains absolute control. The architect being the agent of the building owner, although the architect is not legally one of the parties to the dispute or difference, he is usually the party who raises the dispute by requiring something to which the contractor objects. Now, under such circumstances, it must be admitted that the contractor's objection to constitute the architect arbitrator is not unreasonable. I do not think the architect suffers any loss of dignity by surrendering to an independent arbitrator the determination of disputes under the contract, but is relieved from much responsibility, and is more free to act independently in the service of his client, the building owner, in carrying on the work, and, as the architect's act can be reviewed, it is a salutary check upon his hasty decision. Doubtless building arbitration is expensive, troublesome and vexatious, the necessity for which it should be the anxious care of the architect to avoid. Although I hold in the highest admiration the perseverance, great ability, and high integrity of the legal profession, I am disposed to think, in building cases requiring special technical knowledge, that an able and experienced architect should universally be appointed arbitrator, with the assistance of a legal assessor when necessary.

It is erroneously believed that the customary and usual commission of five per cent is a legal one. For uniformity of practice the Institute has issued a scale of professional charges to which the architect is fairly entitled, and these charges can be recovered in a court of law, if such customary commission can be proved to be a fair and reasonable charge for the work done. The words of a recent judgment are: "No body or society have any right whatever to fix the charges at certain sums; it is a mere question of '*quantum meruit*,' that is, the measure of value of the work done." Therefore, although the architect's usual commission of five per cent is seldom objected to by a client, except under the special circumstances of a large, very plain building, or when many portions of a building are in duplicate, the commission must not be assumed to be a legal charge, recoverable as a commission, without proof that for the work done the charge is fair and reasonable. Under such circumstances it is the safest course for you to enter in your diary each day's work of yourselves and clerks, with all expenses and outgoings. With such a corroborative proof of time, labor, and expense expended in the work, you may have little fear of recovering the amount of your commission according to the Institute scale.

"The ownership of drawings" on the completion of the works has been a vexed question, which has resulted in the architect being unable to retain the drawings, if requested to give them up to the building owner. It has been contended that, as the drawing is the vehicle or tool by the use of which the architect provides the client with the building required, it cannot, in fairness, be claimed by the building owner; but it must be borne in mind that the building owner pays for the plans, and a separate charge for them is recognized by the Institute scale; therefore he would appear to be entitled to them. If, during the progress of the works, the building owner requires, for furnishing or any other purpose, copies of the plans, he would be furnished with them. Therefore, however reluctant we may be to part with our drawings, we certainly have no legal claim upon them after our charges are paid, and in this respect we are no worse off than the solicitor whose client claims his papers; but in the few cases which occur when drawings are demanded, we must be satisfied with keeping copies. I beg, in conclusion, to add a word of warning. Although the young architect should possess

"The keen spirit, which seizes the prompt occasion,
Makes the thought start into action,
And at once plan and perform, resolve and execute,"

I would bid him beware of restless ambition, which,

"Like a circle in the water,
Never ceases to enlarge itself,
Till, by broad spreading, it disperses to nought."

Amid all the changes and chances of a checkered professional career, I would suggest for your professional shield, "purity and strength."

PAPER AND CONCRETE CHIMNEYS.

501 Caledonian Road, Holloway, London, England,
November 22, 1883.

To the Editors of the American Architect:—

Dear Sirs,—Will you kindly allow me to ask through your columns if any one in America has built a *paper chimney*, or can some subscriber give a description or details of the paper chimney erected in Breslau? It is stated to be fifty feet high, and by a chemical preparation is rendered fire-proof (?), and also impervious to water. Also, I wish to ask if any chimney stalks have been built in America of concrete. I know there is one at South Dock, Sunderland, England, about fifty-six feet high from ground, and I should like to hear of any others that may have been erected.

Hoping you will please favor me by allowing these queries to appear in your paper, I am, sir, Yours faithfully,

R. M. Bancroft.

BRICK PIERS.

New York, December 8, 1883.

To the Editors of the American Architect:—

Dear Sirs,—In the article on the catastrophe at Madison, Wisconsin, published in your issue of the 1st inst., it is claimed "That the fall of the structure was due to the failure of the brick piers upon which the columns rested which supported the floors and roof of the ruined building." Whether it be true or not it seems very likely to have been the case. It has been found in this city that a large number of brick piers were insufficient to sustain with safety the load upon them, leading to the conclusion that no calculation as to their strength was ever made. Not only this, but a large number of plans are presented to the Bureau of Inspection of Buildings, showing that no attempt was made to proportion the brick piers to the columns above and the weight to be imposed — numerous instances have occurred wherein it was proposed to impose from twenty to fifty tons per square foot on the brick piers.

While on this subject I may be permitted to say that I do not approve the practice of using bond-stones in brick piers for the reason that the bonding of the brick is amply sufficient, and that the bedding of the bond-stone is not to be trusted to the average workman. Neither do I approve of the practice of running up the outside face-brick of the piers, and then grouting the inside courses; far better to lay all the brick in courses at the same time, and with mortar of the same consistence as that used for the outer face of pier. I have found by experience that the interior of grouted piers settled below the outer course of brick, leaving the bond-stone in rapidly built piers bearing only on the outer or face-brick of pier. Whenever a pier is grouted with lime-mortar the cap-stone should not be put on until at least twenty-four hours thereafter, and this stone and iron base-plate, or both combined should be of sufficient thickness to receive the weight above and transmit it to the pier below, which in numerous instances I have found not to be the case.

Respectfully, W. P. E.

New Applications of Luminous Paint.— Some useful applications have lately been made in England of luminous paint where it is desirable to render objects visible in the dark, such as life and mooring buoys, numbers of vessels, dangerous rocks and headlands, a large rock having recently been painted. Perhaps the most striking application is the painting of the mariner's compass on board ship, by which means it is rendered clearly visible, and the course can be easily kept should the lamp be extinguished.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

289,796. Steam-Boiler. — George H. Asire, South Bend, Ind.

289,802. Heating-Stove. — Philo D. Beckwith, Dowagiac, Mich.

289,804. Door-Bell. — Ellis S. Bloomfield, Jr., Jersey City, N. J.

289,811. Decorating Ceilings and Walls. — Frederick E. Cheesman, Flushing, N. Y.

289,821. Cut-off for Conductors. — W. Frank B. Fisher, Springfield, O.

289,831. Stench-Trap. — Charles Halstead, New York, N. Y.

289,832. Window-Blind. — Jacob B. Hartman, Wooster, O.

289,840. Heating-Stove. — Samuel Ingling, Dowagiac, Mich.

289,847. Water-Back and Boiler-Fitting for Ranges. — James McGinley, Chicago, Ill.

289,849. Hasp-Lock. — Ernest R. Michaelis, Sycamore, O.

289,858. Disinfectant. — George E. Rice, Boston, Mass.

289,868. Paint. — Albert Sorg and Franklin D. Phillips, Ann Arbor, Mich.

289,869. Fire-Extinguishing Apparatus and Escape. — Patrick Henry Spelman, New York, N. Y.

289,876. Fire-Escape Ladder. — Robert M. Wilson, Brooklyn, N. Y.

289,885. Door-Hanger. — Caleb Brinton, Chicago, Ill.

289,886. Door-Hanger. — Caleb Brinton, Chicago, Ill.

289,900. Protecting Iron Water-Pipes from Rust. — Frederick Eaton, Los Angeles, Cal.

289,905. Safety-Appliance for Elevators. — Alfred Fitzroy, Brooklyn, N. Y.

289,908. Fire-Escape. — John Griesenauer, Dardenne, Mo.

289,924. Fire-Escape. — John B. Morris, New York, N. Y.

289,937. Basin and Water-Closet Valve. — Holland Smith, San Francisco, Cal.

289,948. Device for Jointing Lumber. — Clarence A. Williams, Webster City, Iowa.

289,961. Door-Hanger. — Frank Birmingham, Hornellsville, N. Y.

289,963. Furnace. — Virgil W. Blanchard, New York, N. Y.

289,965. Steam-Radiator. — George B. Boomer, Tarrytown, N. Y.

289,967. Hot-Air Furnace. — Charles B. Boynton, New York, N. Y.

290,007. Fire-Escape. — James H. Downing, Lane, Kans.

290,024. Lock and Latch. — Henry Hersee Freeman, Milton, Ontario, Can.

290,041. Ventilator. — David Groesbeck, New York, N. Y.

290,048. Self-Closing Hatchway. — Charles C. Hartung, St. Louis, Mo.

290,071. Window-Sash. — Tolbert Lanston, Washington, D. C.

290,076. Fire-Escape. — Miles K. Lewis and Euclid Sanders, Hastings, Neb.

290,080. Fire-Escape. — W. Clay Lutz, Bedford, Pa.

290,084. Combined Register and Ventilator. — William H. Maxfield, Maysville, Ind.

290,093. Door-Hanger. — David Nickel, Morris, Ill.

290,119. Hasp-Hook. — Geo. H. Sargent, New York, N. Y.

290,133. Metallic Plastering-Surface. — Jas. Stanley, New York, N. Y.

290,172. Air-Heater for Furnaces. — Virgil W. Blanchard, New York, N. Y.

290,177. Fire-Escape. — John Miner Cunningham, Flora, Ill.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Since our last report six permits have been granted, which are as follows: —

M. J. Sappington, three-st'y brick building, e s McCulloh St., n of Presstman St.

D. F. Haynes & Co., two-st'y brick building, 26' x 71', s w cor. Nicholson and Decatur Sts.

Lineweaver & Co., one-st'y brick building, 20' x 52', s s Granby St., between East Falls Ave. and Albemarle St.

Jas. J. Sullivan, two-st'y brick stable, in rear of 139 Dallas St.

Francis Krug, three-st'y brick building and two-st'y brick stable, n e cor. Central Ave. and Biddle St.

Josephine L. Slaughter, three-st'y brick building, w s Stirling St., between Madison and Chew Sts.

Boston.

Building Permits. — *Brick.* — *Marlborough St.*, Ward 11, for Robert Bradley, dwell., 24' x 68', four-st'y flat.

Parker St., rear, near Boylston St., Ward 22, for Samuel G. Snelling, carpet-beating building (iron), 28' x 40', two-st'y flat; J. D. Payne, builder.

Baldwin St., near Northampton St., Ward 18, for Hancock Inspirator Co., factory, 76' x 175', four-st'y; ell, 38' x 56'; Gooch & Pray, builders.

Wood. — *Woodville Sq.*, off Cottage St., Ward 20, for Guy A. Clifford, dwell., 15' x 19½', and 22' x 32', two-st'y pitch; Guy A. Clifford, builder.

Eutaw St., No. 118, Ward 1, for Chas. E. Day, dwell., 16' x 18' 6'' and 21' x 29', two-st'y mansard; Frame & Patten, builders.

Gilbert St., near Centre St., Ward 23, for Owen Nawn, dwell., 26' x 38', three-st'y flat; Stephen McNeil, builder.

Gardner St., near Chester St., Ward 25, for Chas. H. B. Breck, dwell., 16' x 17' and 22' x 26', two-st'y pitch; Daniel M. O'Connell, builder.

Gates St., No. 81, cor. East Eighth St., No. 312, Ward 15, for Henry B. Stratton; dwell. and store, 22' x 38', three-st'y flat; Henry B. Stratton, builder.

Gates St., No. 79, Ward 15, for Henry B. Stratton, dwell., 22' x 24', three-st'y flat; Henry B. Stratton, builder.

Woodville Sq., off Cottage St., Ward 20, for Guy A. Clifford, dwell., 14' x 16' and 19' x 30', two st'y pitch; Guy A. Clifford, builder.

Cliff St., rear, near Glenwood St., Ward 21, for G. A. Brackett, mason's locker, 16' x 40', one-st'y flat; G. A. Brackett, builder.

Franklin St., near Lincoln St., Ward 25, for C. E. Dearborn, dwell., 24' and 30' x 32', two-st'y pitch; C. E. Dearborn, builder.

E St., No. 225, Ward 13, for Chas. Reedes, dwell. and store, 22' x 36', three-st'y flat; P. F. Hanlon, builder.

Elliot St., near Pond St., Ward 23, for Charles Penhallow, dwell., 27' x 47', two-st'y pitch.

Warren St., Nos. 25, 27 *and* 29, Ward 21, for Francis A. Brooks, carriage-manufactory, 50' and 50' 6'' x 78' and 81', three-st'y mansard; Warren Hayford, builder.

Lauriat Ave., near Norfolk St., Ward 24, for G. W. Goodale, 2 dwells., 14' x 19' and 22' x 31', two-st'y pitch.

Cliff St., Nos. 28 *and* 30, Ward 21, for George W. Brackett, 2 dwells., 20' x 40', three-st'y flat; Geo. A. Brackett, builder.

Elm St., near Ford St., Ward 1, for Thomas Yeomans, carpenter-shop, 18' x 24', one-st'y pitch; Thos. Yeomans, builder.

South St., near Washington St., Ward 23, for Patrick Devine, 2 dwells., 19' x 28', two-st'y pitch; D. Johnstone, builder.

Bennett St., near Parsons St., Ward 25, for Pierce Quirk, dwell., 22' and 30' x 30', two-st'y pitch; Pierce Quirk, builder.

Hyde Park Ave., near Wakefield St., Ward 23, for Richard White, 11' x 15' 6'' and 21' x 52', two-st'y pitch; Dougall McDonald, builder.

Brooklyn.

House. — For Mr. J. C. Hoagland a four-st'y and basement residence, brick, with brownstone finish, 38' x 75', is to be built at No. 366 Clinton Ave., from designs of Messrs. Parfitt Bros., at a cost of about $60,000.

Building Permits. — *Quincy St.*, s s, 100' e Bedford Ave., 2 three-st'y brownstone front dwells., tin roofs; cost, total, $11,500; owner, Mrs. Creighton, 179 Quincy St.; architect, T. F. Houghton.

Park St., Nos, 16 *to* 22, s e s, 150' e Broadway, 4 three-st'y frame double tenements, tin roofs; cost, each, $4,300; owner, Catharine Straub, 11 Lewis Ave.; architect, T. Engelhardt; builder, Geo. Straub.

Flushing Ave., No. 867, n s, 260' e Broadway, tin roof; cost, $3,600; owner, Mrs. J. Hecht, 607 Broadway; architect, A. Herbert; builders, J. Rauth and C. Schneider.

Central Ave., n w cor. Himrod St., two-st'y frame tenement, tin roof; cost. $2,400; owner, Robert Seabury, 135 Central Ave.; builder, W. H. Nicholls.

Prospect Pl., Nos. 202 *and* 204, s s, 241' 10'' w Vanderbilt Ave., 2 three-st'y brick dwells., tin roofs; cost, each, $2,500; owners, J. H. Hill, 393 Flatbush Ave., and P. B. Rogers, 119 or 129 Prospect Pl.; carpenter, Geo. Scheel.

Lorimer St., No. 490, e s, 350' n Van Cott Ave., three-st'y frame double tenement, tin roof; cost, $5,500; owner, Peter Kohlman, 492 Lorimer St.; architect, J. F. Smith; builder, Jno. Brundle.

DeKalb Ave., n s, 22' e Evergreen Ave., three-st'y brick store and tenement, tin roof; cost, $4,000; owner, Hugh O'Brien, 231 Evergreen Ave.; builders, H. McZuilken and P. F. O'Brien.

Ellery St., Nos. 94 *and* 97, s s, 110' e Marcy Ave., 2 three-st'y tenements, tin roofs; cost, each, $3,500; owners and builders, Geo. Lehrian & Sons, 321 South Fifth St.; architect, T. Engelhardt.

Park Pl., n s, 133' 10'' e Fifth Ave., 4 two-st'y brownstone front dwells., tin roofs; cost, each, $5,000; owner, architect and builder, Jno. V. Porter, 184 Park Pl.

Twelfth St., n s, 100' w Third Ave., 4 three-st'y frame tenements, tin roofs; cost, each, $4,000; owner, F. L. Corwin, 108 Wall St., New York City; architect, J. H. Herbert.

Twelfth St., n s, 296' 6'' e Fifth Ave., 3 two-st'y brownstone front dwells., tin or gravel roofs; cost, each, $7,000; owner, Jno. C. Bushfield, 64 Utica Ave.; architect, R. H. Heasman.

Seventh Ave., e s, 147' s Carroll St., 4 three-st'y brownstone front dwells., tin roofs; cost, each, $7,500; owner, Henry Lonsdell, Ninth St., cor. Seventh Ave.; architect and builder, A. V. B. Bush; mason, Jacob Brown.

Evergreen Ave., s w cor. Ralph St., three-st'y frame store and tenement, tin roof; cost, $3,500; owners and architects, Young & Lamb, 84 Bushwick Ave.

Garfield Pl., n s, 290' 9'' w Sixth Ave., 4 two-st'y brownstone front dwells., tin roofs; cost, each, $5,000; owner and builder, Edward H. Mowbray, 317 Seventh St.; architect, W. J. Conway.

Buffalo, N. Y.

Building Permits. — Frame house, Elliott St., near Carrollton St.; cost, $11,000; owner, J. Fischer; architect, G. J. Metzger.

Frame house, Clinton Ave.; cost, $5,000; owner, F. F. Umbehann; architect, G. J. Metzger.

Police headquarters and Station No. 1, on the Terrace; cost, $58,000; architect, M. E. Beebe.

Stone dwelling-house, North St.; cost, $23,000; owner, Mr. Andrew Langdon; architect, James G. Cutler.

Addition to the "Sanitarium;" owner, Dr. R. V. Pierce, Main St., near Tupper St.; architect, A. C. Eseuwein.

Brick residence, Allen St.; cost, $8,000; owner, Mrs. D. C. Weed; architect, C. R. Percival.

Stable. — North Division St., cor. Spring St., brick stable; cost, $7,500; owner, A. J. Benzing; architect, G. J. Metzger.

Chicago.

Church and School. — Solomon Wheeler, of this city, has deeded the Episcopal church a valuable tract of land in the western division of the city, and advanced $200,000 towards the erection of a church and preparatory school.

Factory. — Wm. Strippelman, architect, planned the four-st'y and basement factory, dry-house and engine-house, for Olbrich & Golbeck: cost, $17,000.

Flats. — Wm. Strippelman, architect, has the following flats under construction: —

Six two-st'y and cellar flats, for Marshall & Paulett; cost, $30,000.

Two-st'y and cellar flat, 25' x 60', Trenton brick, stone trimmings, for Mary E. Shonk; cost, $7,000.

Two-st'y basement and attic flats, 25' x 60', for A. Dressel; cost, $6,000.

Two-st'y flat, 20' x 50', for Peter Ray; cost, $5,000.

Stores and Flats. — The following stores and flats, planned by Wm. Strippelman, architect, are now being erected: —

Three three-st'y stores and flats, 70' x 75', for Wm. Fitzgerald; cost, $25,000.

Three three-st'y stores and flats, 70' x 75', for John Gersteller; cost, $25,000.

Three-st'y store and flats, 68' x 109', for J. Moeller & Son; cost, $18,000.

Three-st'y store and flats, 24' x 65', for G. Schneider; cost, $7,500.

Three-st'y store and flats, 24' x 55', for B. Stein; cost, $7,000.

Three-st'y and basement store and flats, 25' x 60', for J. Stornberger; cost, $7,000.

Two-st'y store and flat, 24' x 72', for J. Boland; cost, $7,000.

Two-st'y store and flat, for T. Katz; cost, $5,000.

Tenement-House. — Wm. Strippelman is architect of the four-st'y brick tenement-house, 22' x 66', to be built for D. Zemansky; cost, $7,500.

Building Permits. — F. Goetowski, two-st'y dwell., 972 North Paulina St.; cost, $2,800.

A. Stupka, two-st'y dwell., 2956 Dashiel St.; cost, $3,200.

Newberry Estate, five-st'y factory, 78' x 78', Illinois St.; cost, $40,000; architect, F. H. Waescher; builder, Thos. Nicholson.

Thomas Dowling, 9 three-st'y dwells., Jackson St., cor. Wood St.; cost, $50,000; architect, W. A. Furber; builders, Geo. Lehman & Co.

H. B. Sortman, 5 two-st'y dwells., 3219 to 3229 Vernon Ave.; cost, $10,000; architects, Wheelock & Clay; builders, Geo. Lehman & Co.

Carter H. Harrison, three-st'y store and dwell., 73 and 75 Fourth Ave.; cost, $10,000; architect, J. J. Flander.

Detroit.

Building Permits. — George Hatt, brick dwell., 90 Garfield Ave.; cost, $4,500.

J. V. Smith, frame stores, 824–830 Gratiot Ave.; cost, $8,000.

J. L. Lyons, brick dwell., 32 Davenport St.; cost, $8,000.

Geo. Watkins, 2 brick dwells. and barns, 427–429 Third St.; cost, $8,000.

A. C. Varney, brick dwell., 40 Canfield Ave.; cost, $14,000.

Mason & Rice, frame dwell., Henry St.; cost, $5,000.

Mason & Rice, brick house, 34 Sibley St.; cost, $4,500.

H. W. Holcomb, brick dwell., 199 Fourth Ave.; cost, $4,300.

Board of Education, brick school-house, Harper Ave.; cost, $7,000.

Henry Carew, brick and wood store, 259 Campan Ave.; cost $3,000.

Mason & Rice, brick dwell., 148 McDougall Ave.; cost, $10,000.

Frank A. Dejat, brick store and dwell., 999 Michigan Ave.; cost, $5,000.

Julius Hess & Co., brick dwell., 29 Garfield Ave.; cost, $7,400.

D. Whitney, Jr., brick and stone store, Woodward Ave.; cost, $40,000.

New York.

Houses. — For Mr. Richard Deeves, plans for four more private residences have been drawn by Messrs. D. & J. Jardine, to be built on the s s of Eighty-third St., 100' e of Ninth Ave. Two will have frontages of 18', one 19', and one 20', all by 52'; cost, about $68,000; fronts, Philadelphia brick with stone trimmings.

Ten residences will be built for Mrs. Flora Sawyer, on the west side of Alexander Ave., from One Hundred and Thirty-seventh to One Hundred and Thirty-eighth St., from designs of Mr. John Rogers; cost, about $90,000.

On One Hundred and Forty-second St., s s, 300' e of Willis Ave., Mr. Wm. O. Gorman will build 4 three-st'y and basement dwells., brick and brownstone fronts, 18' 9'' x 45' each; cost, $75,000.

Building Permits. — *One Hundred and Twenty-eighth St.*, s s, 245' e Tenth Ave., two-st'y brick storage-building, gravel roof; cost, $15,000; owner, D. G. Yuengling, 1 East Sixty-second St.; architect, Paul F. Schoen; builders, J. & L. Weber.

One Hundred and Fifty-sixth St., n s, 200' w Elton Ave., 2 three-st'y frame dwells., tin roofs; cost, each, $2,200; owner, Peter Kleemann, 116 Essex St., builders, C. Haffen and Geo. Folger.

Seventy-first St., n s, 325' e Second Ave., 5 four-st'y brownstone front tenements, tin roofs; cost, each,

$15,000; owner, Jacob L. Maschke, 113 Rivington St.: architect, John C. Burne.

Fifty-seventh St., n s, 150′ e Lexington Ave., three-st'y brick stable and dwell., tin roof; cost, $16,000; owner, D. B. Fayerweather, 115 East Fifty-seventh St.; architects, Chas. Romeyn & Co.; builders, Alex. Brown, Jr., and Guy Culvin.

One Hundred and Twenty-third St., s s, 211′ 4″ w Third Ave., three-st'y brick stable, tin roof; cost, $12,000; owner and mason, Jere. C. Lyons, 212 One Hundred and Twenty-seventh St.

West Fifty-fourth St., No. 100½, five-st'y brick dwell., tin roof; cost, $8,000; owner, Aug. Brackman, 963 Sixth Ave.: architects, Miller & Reickert.

Eighty-eighth St., s s 160′ s Third Ave., 4 five-st'y brick tenements, tin roofs; cost, each, $14,000; owner, John G. MacDonald; 1532 Park Ave.; architect, A. B. Ogden.

One Hundred and Fifteenth St., n s, 200′ w Fifth Ave., two-st'y brick stable, slate roof; cost, $5,000; owner, Morris S. Hermann, 9 and 11 Franklin St.; architect, Geo. W. da Cunha.

South Fifth Ave., No. 63, five-st'y brick factory, metal roof; cost, $20,000; owner, Lorillard Spencer, 3 Mercer St.: architect, Jno. B. Snook.

Sixty-eighth St., n s, 125′ w Eleventh Ave., 3 five-st'y brick tenements, tin roofs; cost, each, $12,000; owner, E. Wadsworth, St. Anns Ave., cor. One Hundred and Forty-seventh St.; architect, C. Baxter.

West Forty-third St., No. 335, five-st'y brick tenement, tin roof; cost, $18,000; owners, L. and L. K. Ungrich, 160 West Thirty-third St.; architect, M. L. Ungrich.

Tenth Ave., e s, Forty-eighth to Forty-ninth Sts., 8 five-st'y brick tenements and stores, tin roofs; cost, two, $12,000 each and six, $15,000 each; owner, Wm. Rankin, 338 West Forty-seventh St.; architect, M. L. Ungrich.

Fifty-sixth St., s s, 325′ e Tenth Ave., 2 five-st'y brick tenements, tin roofs; cost, each, $20,000; owner, Wm. Henderson, 512 East Eighty-second St.; architect, John C. Burne.

Tenth Ave., Nos. 508, 510 *and* 512, 3 five-st'y-brick tenements and stores, tin roofs; cost, each, $14,000; owner, Margaret E. Niebuhr, 131 East One Hundred and Twelfth St.; architect, Geo. W. da Cunha.

Eleventh Ave., w s, 25′ 5″ s Sixty-ninth St., 2 five-st'y brick tenements and stores, tin roofs; cost, each, $15,000; owner, John Wm. Guntzer, 76 Second Ave.; architect, J. T. Brett; builders, Robert Shaw and Watkins Bros.

Sedgwick Ave., w s, 800′ s Morris Dock Station, two-st'y frame dwell., slate and tin roof; cost, $3,000; owner, John Biggart, 247 West Eighteenth St.; architect and carpenter, Wm. Biggart.

Prospect Ave., n e cor. Isaac St., Fordham, two-st'y frame dwell., shingle roof; cost, $3,000; owner, Henry D. Puroy, cor. Berrian Ave. and Isaac St.; architect, Arthur Arctander.

Sixty-ninth St., s s, 200′ w Eleventh Ave., 4 five-st'y brick tenements, tin roofs; cost, each, $15,000; owner and builder, Richard Claffy, 903 Bushwick Ave., Brooklyn; architect, Elbert D. Howes.

Alterations. — *West Fifty-second St., Nos.* 314 *and* 315, raise mansard to full st'y, four-st'y brick extension and internal alterations; cost, $10,800; owners, Jas. H. Lyon; 314 West Fifty-second St., and Sarah M. Horn, 316 West Fifty-second St.; architect, Wm. Bedell; builder, not selected.

Ann St., n e cor. Theatre Alley, internal alterations; cost, $5,500; owner, Isabella Goff, 355 West Thirty-fourth St.; architect, Jas. E. Ware; builders, Robinson & Wallace and J. C. Wessells.

West Forty-second St., No. 500, cor. Tenth Ave., show-windows on street and avenue, and internal alterations; cost, $5,000; Henry A. Smith, 460 West Forty-fourth St., lessees, the Paper-Hangings M'f'g of the Geo. W. Allen Company (limited), on premises; architect, Jacob M. Mould; builders, Amos Woodruff's Sons.

Park Ave., n w cor. Forty-first St., rebuild walls of upper story, and internal alterations, flats; cost, $8,000; owner, Chas. Duggin, 310 Madison Ave.; architects and builders, Chas. Buek & Co.

Nassau St., No. 120, roof of main building raised, extension to be raised three stories; cost, $5,000; owner, Wm. Kramer, 50 Bowery; architect, J. Kastner.

Philadelphia.

Building Permits. — *Twentieth St.*, cor. Glenwood Ave., two-st'y planing-mill, 55′ x 65′; Chas. Blanchard.

Market St., No. 4025, rear of, two-st'y bakery and stable, 40′ x 40′; R. W. Strode, contractor.

Girard Ave., e of Sixty-third St., two-st'y stable, 22′ x 50′; Kister & Orem.

Market St., No. 731, third st'y addition to store, 24′ x 50′; Jno. Foreman, contractor.

Thirty-first St., n e cor. Thompson St., two-st'y ice house, 52′ x 52′; Jas. B. Doyle, contractor.

Broad St., n of Cambria St., two-st'y feed-store, 40′ x 50′; Geo. M. Christman, owner.

Twenty-first St., n of Johnson St., 3 three-st'y dwells., 19′ x 72′; Chas. W. Budd, owner.

Sixteenth St., between Tioga and Ontario Sts., three-st'y dwell., 16′ x 33′; Jacob Blinn, owner.

Park Ave., s of Susquehanna Ave., three-st'y school-house, 45′ x 58′; R. J. Dobbins.

Sixth St., n of Cambria St., two-st'y dwell., 17′ x 44′; W. Tecklenburg, contractor.

Centre St., w of Thirty-sixth St., 3 two-st'y dwells., 14′ x 40′; W. S. Shedwick & Bro.

Lewis St., between Tioga and Venango Sts., two-st'y dwells., 14′ x 30′; Geo. Lutchendorf, owner.

Huntingdon St., cor. Franklin St., 3 two-st'y dwells., 15′ x 44′; also, one-st'y store and dwell., 16′ x 46′; Jno. Loughran.

Sixteenth St., n of Moore St., three-st'y dwell., 16′ x 41′; Hugh Moody, owner.

PROPOSALS.

COURT-HOUSE.

[At Marion, O.]

Marion, O., December 4, 1883.

Notice is hereby given that sealed proposals will be received at the Auditor's Office, at Marion, O., up to 1 o'clock, P. M., on the 4th day of January, 1884, for the furnishing of materials and labor required in the construction of a fire-proof court-house for Marion County, O., as per plans and specifications by D. W. Gibbs & Co., architects, now on file at the Auditor's Office of said county.

Each proposal must be accompanied by a good and sufficient bond in the sum of one thousand dollars, conditioned that, if awarded the work, he or they will enter into a contract and give the bond required in specifications.

Blank bids will be furnished by the Auditor.

The right reserved to reject any or all bids.

By order of the Commissioners.

418 B. F. WAPLES, Auditor.

PROPOSALS.

SCHOOL FURNITURE.

[At Cincinnati, O.]

Sealed proposals will be received at the Office of Public Schools **until Monday, December 24, 1883, at 12 M.**, for furniture and repairs of furniture for one **year**, according to specifications on file in said office.

Each bid must contain the name of every person interested therein, and must be accompanied by a sufficient guaranty by some disinterested person, that if the bid is accepted a contract will be promptly entered into, and the performance of it properly secured.

Bids must be upon blank forms, to be obtained in said office.

The right is reserved to reject any and all bids.

Bids must be addressed to

GUSTAV R. WAHLE,
417 Chairman Committee on Furniture.

FOUNDATION CRIB.

[At Sand Beach, Mich.]

Office of Light-House Engineer,
Eleventh District,
Detroit, Mich., December 13, 1883.

Sealed proposals, in duplicate, will be received at this office **until noon of Thursday, the 27th day of December, 1883,** for building and putting in position a foundation crib for a light-house at the Harbor of Refuge, Sand Beach, Mich.

Plans and specifications can be seen at this office, where blanks for making bids, with necessary bonds, etc., can be had on application.

The right is reserved to reject any or all bids, and to waive any defects.

CHAS. E. L. B. DAVIS,
Captain of Engineers, U. S. Army.
417 Engineer Eleventh Light-house District.

SEWER.

[At Buffalo, N. Y.]

December 13, 1883.

Sealed proposals will be received by the Board of Sewer Commissioners of the City of Buffalo, N. Y., at No. 31 City and County Hall, in said city, **till Friday, December 28, 1883, at 3 o'clock**, P. M., for the construction of the outlet section of the Buffalo Trunk Sewer, in accordance with plans and specifications on file in the office of the Engineers, No. 44 Chapin Block, in Buffalo.

Each proposal must be accompanied with a bond in a penalty of 25 per cent of the bid, executed by two sureties residing in the State of New York, conditioned that the successful bidder will execute the contract and give security therefor, as required by the specifications.

The Commissioners reserve the right to reject all bids.

D. C. BEARD,
417 Chairman Board Sewer Commissioners.

HEADSTONES FOR NATIONAL CEMETERIES.

Office of National Cemeteries,
Washington, D. C., December 12, 1883.

Sealed proposals, in triplicate, with a copy of this advertisement attached to each, will be received at this office **until 12 o'clock, noon, Tuesday, January 15, 1884,** for furnishing three thousand headstones, more or less, of American white marble, for unmarked graves of Union soldiers, under the provisions of the acts of Congress of March 3, 1873, and February 3, 1879.

Specifications for the work, blank forms of proposals, and all necessary information on the subject, will be furnished on application to this office.

Proposals are required to be submitted on the forms supplied for the purpose.

The right is reserved to reject any or all bids.

Bids should be endorsed "Proposals for furnishing Headstones," and addressed to the undersigned.

R. N. BATCHELDER,
418 Deputy Q. M. Gen., U. S. Army.

MISCELLANEOUS SUPPLIES.

[At Philadelphia, Pa.]

Office Philadelphia Gas-Works.

Sealed proposals will be received **until 2 P. M., Monday, December 24, 1883**, for the furnishing in such quantities, at such times, and to such stations as directed by the undersigned, of all the supplies of the following kinds required by this Department during the year 1884: —

Paints, oil, turpentine, varnishes, etc.
Lumber, hardware, iron and steel.
Window and lamp glass, B. H. matches.
Wrought-iron tubing, fittings, lamp rods and bends.
Street lanterns, lamp stems, burner-cleaners.
Lamp-posts, stop-box rims and covers.
Pig-lead, lead pipe, block tin.
Lubricating oils, etc.; stationery for Works.
Brass, service and meter cocks, valves and screws.

All brass work to be of heavy patterns and Philadelphia manufacture.

Schedules of the different kinds and amounts required can be seen at the office, southwest corner Twenty-second and Filbert Streets.

The right is reserved of rejecting any or all bids deemed prejudicial to the interest of the Works.

Address to the undersigned, at office, No. 20 South Seventh St., endorsed "Proposals for — (here state description of goods).

417 WM. K. PARK, Chief Engineer.

PROPOSALS.

WATER-WORKS.

[At Fort Smith, Ark.]

The Board of Aldermen of the city of Fort Smith, Ark., desiring to obtain a system of water-works, will grant a liberal franchise to a company willing to erect and operate the same. To that end propositions will be received up to the **first Monday in February, 1884.** For information address

ED. M. KENNA.
418 Chairman Committee on Water Works.

ELEVATOR.

[At Washington, D. C.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., December 12, 1883.

Sealed proposals will be received at this office **until 12 M., on the 3d day of January, 1884,** for furnishing and erecting complete, one hydraulic freight elevator for the cash room of the Treasury Department Building at Washington, D. C., in accordance with specification, copies of which and any additional information may be had on application at this office.

418 M. E. BELL, Supervising Architect.

STEAM-HEATING APPARATUS.

[At Mobile, Ala.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., December 13, 1883.

Sealed proposals will be received at this office **until 12 M., on the 7th day of January, 1884,** for supplying and fixing in place complete a low-pressure return-circulation steam-heating apparatus, in the custom-house building, at Mobile, Ala., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office, or the office of the superintendent.

418 M. E. BELL, Supervising Architect.

ELEVATORS.

[At New York City.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., December 7, 1883.

Sealed proposals will be received at this office **until 12 M., on the 21st day of December, 1883,** for furnishing and erecting two steam freight-elevators, one in the Assay Office Building and the other in Public Stores Building, corner Laight and Washington Sts., New York City, in accordance with specification, copies of which and any additional information may be had on application at this office or the office of the Superintendent of Repairs at New York City.

M. E. BELL,
417 Supervising Architect.

GLASS.

[At Charleston, W. Va.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., December 11, 1883.

Sealed proposals will be received at this office **until 12 M., on the 3d day of January, 1884,** for furnishing and delivering, ready for fixing in place, all the plate, double thick sheet, double-thick sheet ground, and cathedral glass required for the post-office, court-house, etc., at Charleston, W. Va., in accordance with specification, schedule and diagrams, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

M. E. BELL,
417 Supervising Architect.

IRON LIGHT-HOUSE FOUNDATION.

[At Fourteen-Foot Bank, Delaware Bay.]

Office of the Light-House Board,
Washington, D. C., December 13, 1883.

Sealed proposals will be received at this office **until 2 P. M. of Thursday, the 27th day of December, 1883,** for furnishing the materials and labor of all kinds necessary for the completion of the metal-work of the foundation cylinder for the Fourteen-Foot Bank Light-House, Delaware Bay.

Plans, specifications, forms of proposal, and other information may be obtained on application to this office.

The right is reserved to reject any or all bids, and to waive any defects.

STEPHEN C. ROWAN,
418 Vice Admiral U. S. Navy, Chairman.

IRON PIPE AND SPECIAL CASTINGS.

[At St. Paul, Minn.]

Office of the Board of Water Commissioners, St. Paul, December 12, 1883.

Sealed proposals will be received at the office of the Board of Water Commissioners of the City of St. Paul **until 12 M., January 14, 1884,** for furnishing said city with the following list of cast-iron water-pipe and special castings, in accordance with the plans and specifications on file in office of said Water Board: —

4,700 lin. feet of 4-inch pipe, with privilege of 4,000 feet additional.

19,150 lin. feet of 6-inch pipe, with privilege of 6,000 feet additional.

8,900 lin. feet of 12-inch pipe, with privilege of 1,000 feet additional.

8,500 lin. feet of 16-inch pipe, with privilege of 1,000 feet additional.

Special castings, 35 tons, with privilege of enough to lay above pipe.

All pipe to be shipped by rail and delivered free on board of cars at St. Paul. Freight to be prepaid.

Pipe and specials to be delivered in such quantities as may be ordered, and within thirty days from date of order, and all to be delivered by October 1, 1884.

Payments will be made by monthly estimates, but no payments will be made before July 1, 1884.

A bond with at least two sureties, in a sum of at least 20 per cent of the gross amount bid, must accompany each bid.

The Board reserves the right to reject any and all bids.

Endorse on envelope, "Proposals for Cast-Iron Pipe and Specials."

JOHN CAULFIELD,
419 Secretary.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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DECEMBER 29, 1883.

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ACCORDING to the *Fireman's Journal*, which quotes from the *Commercial Bulletin*, the losses by fire in this country during the first eleven months of the present year have been about ninety-two millions of dollars, and it is probable that the total of losses for the year will reach the round sum of one hundred millions. If we add to this the expense of maintaining insurance officers and agents, we shall find that the cost of combustible construction, carelessness, and incendiarism in the United States has been this year at least one hundred and fifty millions of dollars. We are often told that by the "blessings of insurance" this enormous burden is "distributed" so as to be "unfelt." In other words, the man who builds the cheapest and most combustible warehouse that he can, fills it with valuable goods and then sets it on fire, either intentionally or by carelessness, gets back the value of his building and goods in cash from the underwriters, and they again collect what they pay out, together with as much more for their own salaries and expenses, by levying a tax upon all the buildings and goods, which is finally added to the price of the goods, and paid by the consumer. To take a single example, the cotton manufacturer pays, in the price, the cost of insurance on the raw cotton until it is delivered at his mill, and a further premium upon the same while in process of manufacture, and upon the buildings in which it is manufactured, with the machinery in them. All these form a part of the cost of manufacture, and are added to the price of the product. From the manufacturer the goods go to the commission merchant, who also pays a premium for insuring them and the building in which he stores them; and from him they go to the jobber and the retailer. Each one of these keeps them, as well as his own warehouse, covered by insurance, and adds the cost to the price of what he sells. Supposing a year to elapse between the gathering of the cotton and its delivery in the shape of cloth, to the consumer, the enhancement in cost, to pay the expense of insurance alone, will be, as a rough average, about two per cent. Every other manufactured article bears a similar tax, in many cases, where the production and sale are slow, amounting to ten or fifteen per cent instead of two; and even raw produce is somewhat burdened. Since the impost bears upon all alike, each person endeavors to reimburse himself by asking a little higher price for his labor, so that in the end the insurance burden diffuses itself as a nearly uniform tax of about two per cent upon the total annual expenditure of every family in the country.

VIEWED in this light, the insurance tax is not so "insensible" as some would have us believe. To state the case in a little different way, every man or woman in the community who is paid for his or her labor, works one week in every year as a gratuitous contribution toward paying the salaries of insurance agents and the fire losses caused by carelessness or crime. Returning again to the original estimate, and setting the total cost of fires and insurance in the United States at one hundred and fifty million dollars a year, we will divide this sum by the number of families in the country, which would be, by the usual reckoning, about ten millions. Ten million families, to raise a hundred and fifty million dollars a year, must pay fifteen dollars apiece, on an average. Taking into account the climate and circumstances of all portions of our territory, it may be safely asserted, we imagine, that fifteen dollars for each family would pay the cost of all the wood and coal used for household cooking and heating throughout the United States; and a transformation in methods of construction, by which conflagrations would be rendered, if not impossible, at least as rare as in some countries, would be a direct pecuniary benefit, equalling in value a perpetual gift to every family in the republic of all the fuel needed for domestic use.

THE New York city government, after taking an immense amount of contradictory testimony as to the danger from electric-light wires above ground, has passed an order that at the end of two years all wires of the kind shall be buried beneath the surface. This decision will relieve the minds of a great many people, who have read with terror the accounts of injury and death caused by accidental contact with electric-light wires, and are little relieved by the astonishing assertions of the engineers representing the companies which now occupy the house-tops. One of these scientific gentlemen, according to the report of the New York *World*, gravely informed a company of visitors the other day that only two persons have been killed by electric-light currents, one of these being a line-man who failed in joining two "line" wires, and the other a deliberate suicide, who grasped the two poles of a dynamo machine intentionally. The reports of accidents to firemen and others who come in contact with such wires on the roofs of buildings, the same expert considers to be quite erroneous, and to have their foundation only in the terrors of persons who, in clambering about, stumble over unobserved obstacles, and ascribe their fall to an electric shock. There may be some truth in this, but the dangerous character of wires carrying currents of high tension is now perfectly established, and the fact that a mistake is occasionally made does not render their removal to a safe place any less desirable.

A RATHER important case has been decided in an English court, involving the question of the proper value of an architect's time. A certain architect and surveyor in Devonshire was employed to make plans of a certain estate, showing how it might be laid out for building purposes, as a guide to the arbitrators who were to decide upon the value of a portion of the land which had been taken for a railway. This work occupied twenty-two hours of the architect's time, according to his memoranda, and eight hours' time of one of his clerks, and his charge was one hundred and ten dollars. In payment of the bill, the owner of the land sent him forty-seven dollars, refusing to pay more, and a suit was brought against him for the balance. The counsel for the defence, with the impudence characteristic of English lawyers, explained that his client had allowed five guineas, or twenty-six dollars, as a "qualifying fee," or compensation for preliminary work, and two guineas, or ten dollars and a half a day, as a "fair allowance" for "professional men." Apparently the lawyer and his client thought that architects ought to work eleven hours a day for that price, and throw in office-rent and clerk-hire; but the judge could not agree with them in their estimate of the proper income of "professional men," and, "considering," as he said, "the amount of ability, knowledge, learning, and skill which the plaintiff brought into operation for the benefit of the defendant," he saw nothing unreasonable in the charge, and ordered judgment for the plaintiff with costs.

MR. JOSEPH CHAMBERLAIN, a very distinguished Radical politician in England, and a high officer of the Government, has made some suggestions in regard to the improvement of the dwellings of the poor which merit attention. In Mr. Chamberlain's opinion, it should be made a punishable offence for any person to own houses in a state unfit for human habitation. To use his own illustration, the law already punishes those who sell diseased meat; and there is no more reason for allowing tenement-house owners to make a profit out of buildings in which health and morality are impossible, than for permitting butchers to poison their customers with bob-veal or trichinous pork. In order that the way may be opened for improving the condition of tenement-house property, Mr. Chamberlain proposes that town and city authorities should be empowered to condemn and take land and buildings, and to reconstruct or build anew, in such manner as to provide wholesome and decent habitations for the very poor, assessing the whole or a part of the cost of such improvements upon the

neighboring estates, as is done in the United States, under the name of assessments for betterment, to defray the expense of laying out parks, or other public works.

ACCORDING to the *Builder*, excavations have recently been made at the site of the ancient temple of Jupiter at Dodona in Epirus, with most interesting results. The temple itself, which was of comparatively recent date, has entirely disappeared, and even its situation is marked as doubtful on the maps; but M. Carapanos seems to have been fortunate in the selection of a spot for sinking trial pits, and the remains of the foundations of the temple were soon reached. The most singular discovery made among the ruins was that of a considerable number of lead tablets, on which were found inscribed the questions submitted to the oracle, which spoke through the talking oak-trees of the sacred grove surrounding the temple. Every school-boy remembers the good advice which a plank from one of these trees, built into the ship Argo, was accustomed to give to Jason and his companions on their voyage; and it is certain that the oracle enjoyed a very high reputation throughout Greece, and that the talking oaks, or rather, the priests who interpreted the language of the rustling leaves, were called upon for advice upon an infinity of subjects. Unfortunately, the questions only appear upon most of the tablets, the inquirer having perhaps been satisfied to carry away the answer in his memory, but one tablet was found which has the question written on one side, and the reply of the oracle on the other. The original owner of this one asks the oracle what deity he must pray to in order to relieve certain members of his family from chronic ailments, and is answered, according to the inscription on the reverse, by a direction to go to the city of Hermione, on the coast of Argolis, and pray to the goddess who would meet him coming from the neighboring island of Hydrea. There is a characteristic indefiniteness about this direction, which adds to the interest of the tablet as a relic of antique life.

THE great Arlberg Tunnel, which is to connect the railways of Switzerland and Austria, has been successfully opened, the entire work having been completed in a little more than three years. Two contractors were employed, one firm excavating from the eastern side, with boring-machines on the so-called "percussion" system, while the other firm worked from the west side, with rotating drills. The rock penetrated was mostly mica-schist, and the percussion drills proved in this to be somewhat more efficient than the others. The rate of progress was very rapid, forty feet a day having frequently been accomplished; and the contractors will in this way secure a considerable extra profit for themselves. Unlike most tunnels, in which the pioneer drift is made at the top of the intended excavation, the Arlberg tunnel was pierced first at the base by the boring-machines, and enlarged upon by hand, the pieces of rock dislodged by the tools falling directly into the trucks used for their removal. The total length of the tunnel is about six and one-half miles, and the roadway in it is graded to a fall of two hundred and sixty feet in that distance.

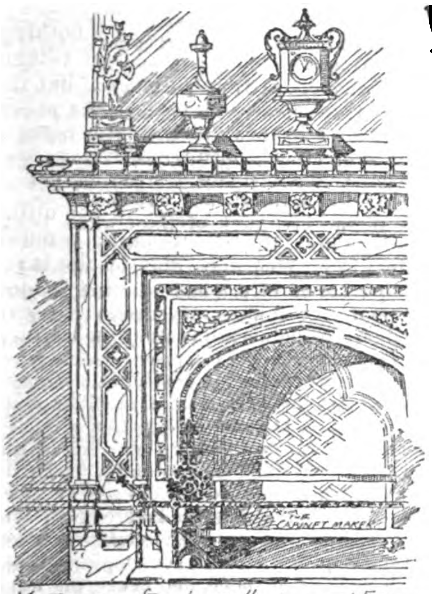
THE subject of the preservation and renewal of forests seems to be growing of more and more importance, and from several quarters come reports of the planting operations in contemplation or now actually in progress. The New York Chamber of Commerce has undertaken to interest itself in the wooded country which lies at the source of the Hudson River, and includes the Adirondack Mountain group, and is endeavoring to persuade the Legislature to purchase the whole district and keep it forever as a wooded preserve. One of the arguments which seems to have had most weight with the Chamber of Commerce committee, in determining to recommend this step, was the very forcible one that the denudation of the Adirondack country would, according to the usual experience, probably diminish very materially the regular flow of water in the river, and might in this way interfere with navigation to a serious extent. It seems hardly possible that the State Government, even of New York, will be prevailed upon to take possession of a vast tract of land in deference to opinions so new, in some respects, as those now current with regard to forests; but it is quite within the power of the public authority to promote tree-planting in such effectual ways as to ensure the continuous replacing of all forests destroyed, without spending any money or sacrificing the rights of private citizens in any way. One mode of accomplishing this result is by relieving from taxation, for a certain number of years, all land upon which a given amount of labor in tree-planting is annually expended. Thousands of farmers pay every year, most unwillingly, heavy taxes upon land which brings them in nothing, being too poor or too uneven to be worth the cost of tillage. Such land is generally well fitted for tree cultivation, but the profits of this, large as they are, are so remote that the necessary time is rarely taken from occupations which promise a quicker return. The remission of taxes, which is to the farmer a saving of just so much of the cash which he can generally so ill spare, would be a great additional inducement to the utilizing of neglected land, and would call forth, if required, a muuh greater amount of volunteer labor than the value of the taxes could purchase in any other way, while the State or town, upon a fair assessment of the land and timber, after twenty-five ro thirty years' growth, would soon get back again, with interest, all the income which it had lost during that time.

ANOTHER of those cases of responsibility of architects which occur so often in France was recently reported in *La Semaine*, with editorial comments. A certain architect made drawings for a church-building, upon which was shown in section the floor, built with beams laid on edge in the usual way, and raised a certain distance above the ground. The builder, in the construction of this portion, found it convenient to throw a quantity of rubbish into the space under the floor, completely filling it, and took the additional liberty of laying the floor-beams on the flat, directly in the rubbish, and spacing them much farther apart than the specifications directed. The floor soon rotted out, the partitions settled, and much of the work had to be reconstructed at considerable expense. It was then necessary to decide who should pay this expense, and the question was referred to the editor of *La Semaine*, who replied, with his usual good sense, that the serious fault in the matter belonged to the contractor, who,t o save himself money at the expense of his employer, deliberately violated his contract, committing thereby an obvious fraud, and making himself liable for the whole cost of making good the whole of the work affected by the consequences of his act. The responsibility of the architect in the case was simply that of the agent of the proprietor. As such an agent he had certainly failed in his duty in regard to this floor, and was liable to have the commission or compensation paid him for that proportion of the whole work reduced, or withheld altogether, and was also bound to make good the expense whidh his employer had incurred in securing other professional service for the defense of his interests.

IT is not quite certain that our law would agree with that of the French in regard to such a case as the following, but it is interesting to notice the way in which matters of the kind are regarded on the other side of the water. Two neighboring lots of land were below the street level. The proprietor of one wished to improve his by filling it to the street grade, but delayed doing so until he had inquired of the editor of *La Semaine des Constructeurs* what obligations he would incur in respect to the owner of the adjoining estate by the change of grade. The reply assured him that under no circumstances would he be entitled to fill his land in such a way that the earth would run down upon his neighbor's property; but that he must either terminate the filling by a slope suited to the character of the material, the foot of which would fall withih his own ground; or must, if he desired to bring the whole to the new level, build a retaining-wall of sufficient strength to hold the mass in place. This retaining-wall, again, although it would serve as the foundation for a wall above, could not, like ordinary walls in this position, be built over the dividing line, as a party-wall, without the express permission of the adjoining proprietor.

A DOUBLE competition, according to the *Builder*, is to be held for the selection of designs for the new Exchange at Amsterdam. The first competition is to be one of sketches only, open to all the world, in which ten equal premiums will be awarded, of one thousand florins each, or about four hundred and fifty dollars. The authors of the five sketches placed first will contend again in a competition for finished designs, and the architect winning the highest place in the second competition will be employed to carry out the building, which is to cost about a million dollars. The other four competitors will be rewarded with prizes of six thousand, five thousand, four thousand and three thousand florins respectively. The sketches are to be submitted by May 1, 1884.

LECTURES ON ARCHITECTURE.[1] — IX.



MANTLEPIECE - STRAWBERRY HILL (RESIDENCE) ENGLAND

WITH the reign of King Henry VII commences a new era in English domestic architecture. Its peculiar origin is very easily accounted for on a reference to history. "The policy of this king," says Mr. Hume, "when he came to the throne, consisted in depressing the barons, and in elevating and promoting men of new families, who were more dependent upon his will. The nobility now, therefore, instead of vying with each other in the number and courage of their retainers, which had hitherto been the case, by degrees acquired a more sociable and laudable emulation — endeavoring to excel in the splendor of their mansions, stables and equipages—while the common people, no longer retained in vicious idleness by their superiors, were now obliged to learn some calling or trade, thus becoming useful, both to themselves and to the State." Henry VII was himself a great builder, and it was with him, and not at the dissolution of the monasteries, which is the generally received opinion, that the Tudor style of architecture came into practice. Of this beautiful style of domestic building we are next to treat.

The Tudor architecture is of three distinct characters, though each is only an improved modification of the one which preceded it. First, we have the turreted style, with bay-windows, the turrets being crowned with domes of an ogee form. Second, that of the turret, the oriel window and the gable with pinnacles, in the time of King Henry VIII, and last, that of gables and pinnacles alone, in the reign of Elizabeth. The palace built near Richmond by Henry VII was in the first style, seeming to derive its general ideas from the Plantagenet castles, with turrets assimilating to those of his celebrated chapel attached to Westminster Abbey. A perspective representation of the exterior of this picturesque and splendid pile has fortunately been preserved, and may be seen in the volumes of "*Vetusta Monumenta*," or ancient monuments of England, engraved from a large original painting of it, ten feet in length by nearly five in height, supposed to have been executed by a pupil of the celebrated Rubens early in the reign of Charles I, and still preserved in good order in the British Museum. But the royal edifice itself now no longer exists. It was seized by Oliver Cromwell, who caused a survey and valuation of the premises to be made preparatory to a sale, but soon after the restoration of Charles II it again passed into the hands of the royal family, though probably in a neglected and dismantled condition, as soon after this period it fell into decay.

The Tudor architecture, however, had not been rendered sufficiently attractive until after Cardinal Wolsey had built his princely palace at Hampton Court. The prototype of the style of this splendid pile may be seen in some degree in Henry VII's chapel at Westminster, and partly in the exquisite gateway of St. Augustine's Monastery at Canterbury. The various roofs, which in the preceding styles had been low and flat, were now much elevated, and clustered chimneys, gables, turrets and pinnacles shot up with a beautiful lightness and delicacy. The fine taste of Wolsey appeared in all the arrangements of this mansion, no less than in the great variety of his other works at Ipswich, Oxford and other places. Henry VIII being himself engaged in building had become exceedingly jealous of the Cardinal on account of the superior beauty of this sumptuous structure, and is reported, on the authority of Stow's "*Annals*," to have asked Wolsey what he meant by erecting a house so much finer than any of the royal palaces. The aspiring minister, thus suddenly and sharply reminded of his relative position toward the monarch upon whose favor only he could depend, had only one part to take; he replied to his majesty's question, "That it was not for himself he was erecting such a dwelling, but if the gift might be accepted the palace of Hampton Court was intended for his sovereign." From what is known of the temper of the King it is probable that if he had not obtained his object in this smooth and easy way he would not have scrupled to resort to rougher means; but the Cardinal did not go entirely unrequited, for, though the King took the new palace without any compunction, yet as a sort of recompense he licensed the minister to live in his manor at Richmond Palace. The Cardinal availed himself of this permission, and seems to have made the best he could of his hard bargain.

The palace of Hampton Court although now abominably disfigured by tasteless and discordant alterations was the finest of the works of that reign; but when the fate of the numerous monastic institutions had been decided by the sacreligious and tyrannical Henry, many of his courtiers and favorites became enriched by their spoils, receiving from him gifts of large manors and estates that had belonged to these suppressed houses. Thus many of the noblemen to whom they were given, causing alterations to be made in these highly ornamented monastic structures, converted them into manor-houses and country seats.

From these contingent events originated a more decided advance in the improvement of domestic architecture. A still more enriched style was produced, examples of which, through the lapse of time, or owing to tasteless innovations, are now rarely to be met with in their perfect and original purity. These edifices were adorned with multitudes of acute-angled gables, and had oriel windows, supported beneath on projections of clustered mouldings. They were mostly built of brick, but some were faced with flints, or more generally checkered in various figures with fine black glazed bricks, so disposed as to produce a very fanciful and agreeable effect. These seem to have been at first introduced for the purpose of employing such bricks as were discolored by burning, in a manner the least unsightly. In a kiln of bricks a certain number must, from their situation, be more strongly acted upon by the fire than the general mass, and these, consequently, become smoked and darkly tinged. With the tact and invention so peculiar to the architects of those ages this seeming disadvantage, like others of equal weight, was turned to good account, and what in other hands would doubtless have been blemishes were converted by them, on the contrary, into embellishments. Instead of allowing the workmen to use such bricks indiscriminately, and thereby disfiguring the wall with spots, they were selected as being more valuable than the others, and wrought into devices where the plainness of these surfaces on the fronts had neither apertures nor stone dressings. Many examples of this pleasing kind of ornament could be given, but those on the ancient manor-house at Bermondsey were perhaps the most striking. They consisted of lozenges or diamond-shaped figures, with crosses upon their upper points; cross-keys and sword; the arms of the diocese of Winchester; the enriched cross, curiously constructed; the cross of St. Andrew; intersecting triangles, in allusion, probably, to the (received) doctrine of the Trinity; the globe and cross, which was the merchant's mark; the badge of the borough of Southwark (of which Bermondsey forms a part), and the representation of the west front of a church comprising a centre, with a semicircular Norman arch under a gable, whose pointed roof terminated also in a cross between two towers, as you will recollect to have seen it represented in the drawing of Salisbury Cathedral. All these ornaments were executed in the discolored bricks, so as to show very distinctly upon the face of the wall, and produced a most lively and picturesque effect. The quoins, or the alternately long and short blocks at the angles of the building, the cornices and other enriched projecting parts were generally of stone.

The chimney-shafts were now also very fanciful and curious. They were made to resemble groups of small columns with pedestals, plinths, bases and capitals. They were made of stamped bricks, moulded into forms of rich lozenge-work, twisted reeds, zig-zag mouldings, and *fleur-de-lis* ornaments. The octagonal turrets, also, on each side of the entrance, on the flanks of the building, and on the advanced entrance gateway were crowned with ogee domes, and surrounded with rampant lions supporting small banners and vanes, which were curiously wrought and gilded. It is, indeed, much to be regretted that most of the edifices of this kind, erected in the time of Henry VIII, are now either in a state of entire dilapidation, or so much modernized, from time to time, as to have lost nearly all their original characteristics; but there are still five or six examples in the County of Warwick in a state of good preservation.

In the reign of Queen Elizabeth the style of domestic architecture that had prevailed during the reign of her father was still followed, but much simplified and made plainer. The plan of the building now generally consisted of three sides of a quadrangle, with a porch in the middle of the centre one, making the form of the plan that of the capital letter E, the first letter of the name of the Queen. Other fancies of this kind were sometimes introduced, and the manor-house built by an eccentric gentleman named John Thorpe exhibits a plan arranged upon the figure of the letters J and T, a complicated but not an inconvenient arrangement. The builder recorded his intention in giving it such a form in the following lines: —

> "These two letters, J and T,
> Joined together, as you see,
> Make a dwelling-house for me."

The width of the windows was now carried out to a great excess during this period, so as even to reduce the piers or solid wall between them to little more than sufficient for the bare support of the fabric. The battlements and embrasures along the summits of the buildings were now discontinued; the low, obtuse Gothic heads of the windows had sunk into straight lines, and the windows were divided by mullion-bars and transoms. Bold gables still prevailed, and the attic windows showing above the roofs were formed by acute triangular pediments, having brackets and pendants surmounted with pinnacles and various other enrichments. Nothing could exceed the lively and cheerful appearance of the Elizabethan mansions.

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[1] Extracts from a lecture by the late Mr. Arthur Gilman, delivered before the Lowell Institute, Boston, in the winter of 1844-45. Continued from page 296, No. 417.

The oriel windows were of various forms. Sometimes they projected in a semicircle, at others, broken into angles, and glazed with quarries, or small lights of a diamond form, as they had been in the ecclesiastical buildings. They were often carried up the whole height of the house from the ground in the form of a continuous bay, and had floral imagery formed in them by intricate frames of lead, dividing the panes into a multitude of lozenge figures, and other forms of glass.

Turrets now began to disappear from the exterior, but the chimney-shafts were still grouped together as in the preceding style. These, however, were generally devoid of ornaments, except mouldings at their bases and tops, and the chimneys were often placed in the external walls of the building, so as to terminate a gable at the top.

It is remarkable that every part of the decorative architecture which is discoverable in the Tudor mansions before the reign of Elizabeth was derived, however remotely, from the ecclesiastical architecture which then prevailed. Its forms and members were distinctively Gothic in their character. This fact is worthy of particular attention, since it aids to keep the mind on fixed principles rather than on mere modifications; but in the reign of Elizabeth the forms and decorations of the two styles, the Gothic and the Italian, became so indiscriminately mingled and confused that no true order or system could be said to prevail. Yet this mingled style is highly attractive and picturesque, although of so nondescript a character that it is impossible to designate it by any intelligibly expressive epithet. It was the result of a gradual change from the battlemented mansion of the later days of feudalism to the lightness and grace of the Italian villa. In the comparatively tranquil times of the maiden queen the nobility, no longer pent up within the walls of their residences, felt themselves at liberty to sacrifice strength to convenience, and security to sunshine. The outline of the structure was still peculiarly English, but Roman mouldings and Florentine ornaments were blended with the ancient details, particularly in the interiors, and at last nearly superseded them.

After this period the builders seem to have indulged their own imaginations without any restraint; but with all the eccentricities of the manner which was thus introduced it yet has very considerable beauties. The angular and circular bay-windows now disappeared entirely, and were supplanted by large square ones of very large dimensions in their height, unequally divided by the transom-bars or separations, and placed in lengthened rows so as to form leading features in the several stories of the building. Battlements of all kinds were now entirely omitted, and the general effect of the pile became one of unbroken uniformity, except by the addition of a square turret in the centre and at the angles of the structure. The houses built in the reign of James I are deficient, however, in much of the picturesqueness found in those of his predecessors. They were on a larger scale than in the time of Elizabeth. Audley Inn, built in 1616, the manor-house of Hatfield in 1611, and Charlton House, in Wiltshire, about the same period, were perhaps the best specimens of this style. The house at Camden, in Gloucestershire, built by Sir Baptist Hickes, and which was burned down during the great civil war, consisted of four fronts, the principal one being toward the garden, and at each angle was a lateral projection of some feet, with spacious windows. The parapet round the roof was finished with pediments of a very capricious taste, and the chimneys were in the form of small Corinthian pillars, with twisted shafts and rich capitals. A capacious dome crowned the roof, which was regularly illuminated for the direction of travellers during the night. This immense building was enriched with friezes and entablatures, most profusely sculptured, and is reported to have been erected at an expense of nearly £30,000: it occupied, together with its offices, a site of eight acres.

In the reign of James I properly commences the career of Inigo Jones, and as he was often employed in domestic architecture, his works in this branch of the art require some present notice. At Venice he had become acquainted with the works of Palladio, and in them he learned, as observed by Horace Walpole, "how beautifully taste may be exerted on a less theatre than (building) the capital of an empire." Milton and Coleshill in Berkshire are strong proofs of the advancement of architecture during his career. But the *plans* of houses introduced from Italy by this master were not, perhaps, altogether suited to the climate or habits of the English, and in this respect a great improvement was effected by his successors. His greatest fault appears to have been that of aiming at magnificence under circumstances in which it could not be attained. Thus the convenience of his rooms was often sacrificed to the show and effect resulting from a hall or a staircase, or both; sometimes, to gain a vista through a suite of apartments, they were made decidedly too small for the general scale of the house. His distribution of windows, also, is purely Italian, and the piers between them are often too large, so that the light admitted is insufficient in quantity. The habits of Italy enabled Palladio to raise his principal floor, and to have the farm-offices and those for the care of the vintage in the same range of building as the mansion, and this imparts an air of great magnificence to the Italian villa. But this arrangement does not seem to be so consonant with English convenience, and the Palladian arrangement of plan is therefore not entirely suited to that country. A plan where the wings are extended laterally to some distance and attached to the centre by a colonnade is certainly productive of a rich and elegant effect; but the arrangement is very adverse to general convenience, especially in mansions of that moderate scale which is in modern times of most general use. Where great splendor of appearance is the first object, use must often yield to it, and we shall find that magnificence must be paid for in convenience as well as money.

But the English architects who followed Jones made use of modes of composition and arrangement peculiar to themselves and more in accordance with what was required by their patrons. It is true that in the transition which universally accompanied the revival of classic architecture (for the national Gothic had now irretrievably gone to decay) the name of Jones, by whom the change was finally accomplished in England, stands in the first rank of those whose genius has rendered them illustrious in art. But the inventive talents of Wren and Sir John Vanbrugh, working upon the style which had long proved its fitness, in the hands of original thinkers, to meet every exigency of society and to assume every characteristic of design, certainly maintained to the eighteenth century the claims of England to a noble and independent school of domestic architecture.

As an artist of great invention, Sir John Vanbrugh has a stronger claim to our notice than any of his predecessors. His buildings are the result of a combination of forms and an anticipation of effects originating solely from himself — effects which no one before him had either contemplated or executed — and such as amply justify the expression applied to him by the distinguished Sir John Soane, that he was "the most poetical of all the English architects." The author of some of the most brilliant and successful comedies in our language, he was often at swords' points with his contemporaries and rivals, but as a wit he was inferior to none, and hence his novel compositions in architecture became objects of derision among the professed critics of the day, as being, in their puny notions, his only assailable point. Attacked also from party feeling, the public opinion of Vanbrugh was biassed by epigrams and smart verses from the pens of Pope and Swift, but when the former, in his fourth epistle, in allusion to Vanbrugh's works, exclaims: —

> "Lo! what huge heaps of littleness around,
> The whole, a labored quarry above ground,"

"he little thought," observes a late writer, "that he was leaving to posterity a record of his consummate ignorance of art, and of his total insensibility to grandeur in all that relates to composition in architecture."

The opinion of Sir Joshua Reynolds first enlightened the public upon the neglected and undervalued works of this extraordinary architect. "I pretend," says the distinguished president, in his fifth discourse before the Royal Academy, "I pretend to no *skill* in architecture; I judge now of the art merely as a painter. When I speak of Vanbrugh, I speak of him merely on our art. To speak, then, of Vanbrugh in the language of a painter: he had originality of invention, he understood light and shadow, and had great skill in composition. To support his principal object he produced his second and third groups of masses; he perfectly understood in *his* art what is most difficult in ours, the management of the backgrounds by which the design and invention are set off to the greatest advantage. What the background is in painting, is the real ground upon which the building is erected; and as no architect took greater care that his work should not appear crude and hard — that is, that it did not abruptly start out of the ground, without expectation or preparation — this the tribute which a painter owes to an architect who composed like a painter."

The thanks of posterity are due to Reynolds for this noble and independent eulogium. He has exactly conceived and happily expressed the peculiar beauties of Vanbrugh's style. But what an unintelligible jargon must his words appear to a modern Greek, who takes a leaf, cut and dried out of Stuart's Athens, sticks it on by way of portico to a three-story house without a particle of ornamental finish around the doors and windows, puts a square appendage to contain the kitchen behind, and calls it "a classic design for a first-class villa!" To *such* a Greek, both Vanbrugh's exquisite conception and Reynolds's enthusiastic praise would indeed be foolishness.

It must be admitted that the merits of Vanbrugh were such as neither Lord Burlington, nor the literati of the time, who supported him in his war against the architect of the stately Blenheim and Castle Howard, were able to appreciate. These gentlemen fell into the very error which in the previous lecture I took the opportunity to denounce — they were struck with admiration of Palladio, just as our present architects are of the ancients, and seizing his works with avidity, instead of studying their principles and considering their intention, they reconstructed exact copies in England, and imagined that to deviate a hair from Palladio's combinations was equivalent to failure and ruin. The object of their admiration was a man, as I have before observed, upon whom Nature had bestowed the faculty of seeing, feeling, and thinking for himself. His designs, therefore, were in perfect accordance with the uses of their design. But Lord Burlington was not such a man as Palladio has been described; far less so were any of those who adopted his tastes at second-hand. Resorting to crude imitations of the great Italian master, only from their want of any definite system or fixed principles in the art, they borrowed their entire plans, as well as the whole arrangement of their elevations, from the exact measurements of his executed works. Thus they were obliged to disregard the exigencies of climate, and to pay but little attention to the domestic habits of the country to which these combinations were imported. The consequences were

fatal. They had rooted up a vigorous plant, to make room for an exotic which they wanted the skill to naturalize. It perished, therefore, leaving nothing in its place, and another half-century found domestic architecture in England reduced to a condition unprecedented since its first development as an art. It was devoid of unity, character, expression and principles.

Had not the high genius and great good sense of Vanbrugh been so counteracted and beaten down by the opposition of Lord Burlington and his set, there is no doubt that his discriminating taste in the selection of the beautiful in his art, and his ingenuity in turning it to his own immediate purposes, would have resulted in as great a number of different examples as have been given to the world from the hand of any master. There was every opportunity at that time for a splendid career; but Vanbrugh's patronage was limited, and names now mostly obscure were lauded far above his own by his contemporaries, who took their idea from Burlington. So dangerous is it for a man, however well-deserved a reputation he may have acquired in other branches of science, to set up as a peremptory critic upon so nice a subject as that of architecture. From the general unacquaintance with the subject existing in the community, and from the facility with which a few subsidiary ideas connected with it may be caught by the tail and paraded with an appearance of profound erudition, such a critic may do more in a very short space to confound all manner of principles, and to retard the progress of the art, than twenty such architects as Vanbrugh and Upjohn could counteract in a generation.

To Kent, who was patronized by Lord Burlington, and who had but little taste in architecture, belongs, however, the high honor of originating the modern style of landscape gardening, which has since risen to such perfection in the system of Sir Uvedall Price. After Kent, the most noted architects of the early part of George III's reign were James Paine, and John Carr of York. The former of these seems to have imitated the peculiarities in the style of Kent, and sometimes to have mixed with them the flimsy decoration which was coming into fashion before he quitted the stage; but his most important works do great honor to his abilities. Worksop Manor in Nottinghamshire, and Redlestone in Derbyshire are conceived in a style of much grandeur. The former was never completed, and the latter is usually assigned to Robert Adam, who carried on the works at a later period; but Paine is undoubtedly entitled to the credit of having designed the magnificent hall of entrance and the principal front, which is singularly elegant and effective. The works of Carr are numerous; Harewood House in Yorkshire is one of his most important productions, and also one of his best. The general characteristic of his style is a certain thinness and weakness, produced by an effort to be light. Heaviness had been the grand reproach levelled at Vanbrugh by the Burlington faction, and the new candidates for favor seemed determined at least to avoid this cause of censure. They succeeded, perfectly to the taste of their patrons, and it is fortunate in this instance that both sides can be so well pleased, since their contemporaries applauded them for being lighter than Vanbrugh, and posterity has unequivocally decided that Vanbrugh is heavy enough to outweigh them all!

THE END.

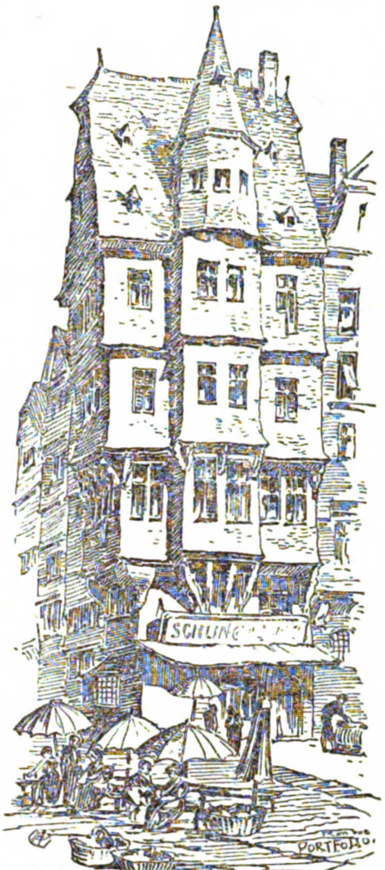
A New Method of Oxidizing Sewage. — Professor J. Koinig proposes to purify town sewage and the waste waters of slaughter-houses, dye-works, breweries, etc, by allowing them to trickle over a network of wire, thus exposing a large surface to the oxidizing action of the atmosphere. He recommends that the coarser impurities should first be removed by means of settling-tanks.

London Sewage Purification. — With a view to the effectual and economical deodorization and purification of the 90,000,000 gallons of sewage daily and nightly flowing into the subterranean reservoirs beyond Beckton, experimental trials of Andrew Parker's process have been in operation since May last, and still continue. Through repeated pumpings before reaching the tanks, and by the action of water, the fæcal matter of London sewage is reduced to solution constituting a dense grayish-black liquid of intensely offensive odor. It is upon this that the Sewage Purifying Association are operating at the rate of 30,000 gallons per day. The sewage, drawn into a tank, is subjected to a powerful steam-forced stream of turgid water, charged with ground clay, caustic soda, hydrochloride acid, and sulphate of iron. The mixture flows into large tanks, and there remains until the action of the precipitates has freed the sewage from sediment, and sends off perfectly pure, odorless, and colorless water into the Thames. The residuum of sludge is kiln-dried and pulverized, constituting a manure reported on chemical analysis to contain a large proportion of ammonia and phosphates, and to be of considerable commercial value. A party of gentlemen were yesterday conducted over the works by Mr. Cecil Fane and Mr. Tedeochi, two of the directors of the Association, and, so far as amateur observation goes, the scheme appears to be completely successful. The Metropolitan Board of Works has merely permitted and sanctioned the construction and action of the works of the Association. It remains to be seen whether that body will enter upon the relatively small outlay that would be required to elaborate the works in order to cope with the whole volume of the sewage now poured into the Thames at every ebb tide with effects unpleasantly familiar to voyagers on that part of the river. It is officially noted that the sewage experimented upon is drawn from four feet above the floor of the reservoir, and is therefore not quite so highly charged with substantial matter as the lowest depth.— *London Daily News.*

THE ILLUSTRATIONS.

THE MAXIMILIAN-STRASSE AT AUGSBURG. — GERMAN RENAISSANCE.

[From *The Builder.*]



OLD HOUSE FRANKFORT. ON THE MAIN.

It is said in Germany that "what Nuremburg is to Gothic architecture, Augsburg is to Renaissance," and it must certainly be allowed that no city in Central Germany exhibits more numerous and valuable examples of the latter style of architecture than does this noble old Imperial city. The "Maximilian-strasse," of which we give a view, almost bisects the town; it is nearly a mile in length, very wide, and bordered on either side by lofty, gabled houses, exhibiting in the form of their gables and elaborate detail every variety of Renaissance architecture, from the earliest, intermixed with much Gothic feeling and treatment, down to the latest and wildest extravagances of the so-called "pigtail style." The earlier houses are rather plain in design, with simple, straight-sided gables, the architectural ornament being chiefly confined to the projecting bow-windows, doorways, and string-courses, which are generally of stone, whereas the surfaces of the walls are of brick, covered with plaster, which has in all cases been adorned with paintings in fresco or distemper. The two houses forming the extreme right and left of our view are excellent examples, that to the left retaining nearly all its original-colored decoration. This house belonged formerly to the Weber family, and was evidently painted by artists possessed of a superior amount of skill to those who generally devoted their labors to this kind of art. The two other very elaborate gables on the left, though highly picturesque, show a later and less pure development of the style, and here we see the scroll gables, key-hole-shaped windows, curved pediments, and other signs of the decay of architectural taste. The vast brick gable, flanked by octagonal, domecapped towers, is that of the town-hall, or Rathhaus, a really noble example of civic architecture, and, though dating from the years 1617–1629, very free from the wildness and eccentricity of the late German Renaissance. The architect of this building was Elias Holl, a native of Augsburg, who excelled not only in architecture, but also as a worker in metals. Many of the ornaments of the noble gable are of bronze, and are supposed to have been modelled by him. The three upper stories of the Rathhaus are occupied by one enormous room called the Golden Chamber. It is 110 feet long, nearly 60 feet wide, and about 50 feet high. The lofty tower near the Rathhaus is in reality the tower of the church of St. Peter, but is used as the watch-tower of the town. It is said to be 350 feet high, and is constructed of brick, which was originally covered with plaster, and, like the houses, decorated with painting. The church itself dates from the fifteenth century, but has been thoroughly modernized during the eighteenth century, and really contains nothing of interest except a few fragments of rather good Renaissance stained glass. The fountain in the foreground of our view is called the "Mercurius-brunnen," and is adorned with a statue of Mercury in bronze, by Adrian de Vries, executed in the year 1599. The street contains two other fountains, the "Augustus-brunnen," by Hubert Gerhard, 1590, and the "Hercules-brunnen," by Adrian de Vries.

The mode of decoration adopted by the earlier Renaissance builders at Augsburg seems to offer several suggestions to the architects of our own time, and it is well worthy of consideration whether we might not adorn the flat plaster surfaces of our London houses with some species of colored decoration. Many firms in London spend thousands of pounds every year in advertisements. Might not the outside of the houses be made artistic advertisements? That advertisements may be made singularly ornamental is proved by the Chinese fans and umbrellas. We remember once asking a friend who had spent many years in the "Celestial Empire" to explain the legends upon these, as we had supposed from the pictures that they were love stories or poems, but to our astonishment they all turned out to be the most bragging and impudent advertisements!

It would, of course, be impossible to have our houses adorned

externally by painting of the highest class, but would it not be possible to set art students at work on some of our London plaster fronts? There is no reason why these pictures should not be movable where it is thought desirable, though of course it would be better for them to be painted direct upon the walls. Even if they were not wonderful as works of art, surely they would be better than the everlasting "stone-color," mud-color, and damson-jam color, which now disfigure the exteriors of our houses.

CHURCH OF NEW ST. MARY'S, BATTERSEA PARK. MR. W. WHITE, F. S. A., ARCHITECT, LONDON, ENG.

[From the *Building World.*]

THIS church is designed to supersede the old parish church of St. Mary's, Battersea, and has been planned on the scale of a minster church, as being the centre of a large district and the mother-church of a number of district churches fast growing up around it. Only a portion of the chancel has at present been built. The material is red brick, with courses of green-garden bed of Wardour stone. The mouldings of arches, windows and doors are of brick, and in fact all but pillars, caps and bases, and some window-heads and sills. The view is taken from the northeast, and shows a future "chapter" room for ecclesiastical meetings of various kinds. This has two gabled roofs, side by side, the room being divided in its width by a row of pillars and arches. The whole has been considerably reduced, both in material and height, on account of cost. The fittings at present are temporary, and a temporary annex, western and north, serves to make up the present accommodation to three hundred.

AGENT'S HOUSE AND ESTATE OFFICES, ECCLESTON, NEAR CHESTER, ENGLAND. MR. JOHN DOUGLAS, ARCHITECT, CHESTER, ENGLAND.

[From the *Building News.*]

THE above buildings are in course of erection on the Eaton Estate (for the Duke of Westminster, K. G.), on rising ground overlooking the River Dee, which affords views of the Peckforton Hills, Beeston Castle, Eaton Hall, etc. The lower story and the stone dressings are worked in the local red sandstone from the adjoining quarry, with bands of Manley stone. The upper part is built in red Ruabon bricks, the roof-covering being red tiles. The principal rooms and hall are finished with oak panelling. The estate offices are enlarged to the right of the arched entrance to the stable-yard.

RESULTS OF TESTS OF THE TRANSVERSE STRENGTH OF BEAMS. — PLATES III AND IV.

FOR explanation see succeeding article.

RAMBLING SKETCHES BY MR. T. RAFFLES DAVISON.— COUNTRY HOMES AT BUSH HILL PARK.

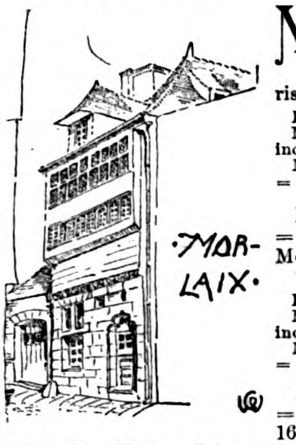
[From the *British Architect.*]

THESE illustrations convey an impression of that quality in detail which makes these country homes so far superior to the class of designs usually offered to the public in the building estates of speculative builders. In our first notice we gave four views of a more general kind, which served to show how liberal of ground and how conservative in preservation of trees have been the freeholders of Bush Hill Park. In these two features we have the key to much of the attractiveness of the place. Take away all, or nearly all the trees from a district, and what is there left? Trees are just the things which help to remove our remembrance of the city and its bustle. Again, deal with your land as meagrely and cautiously as in a town, or a fashionable suburb, measuring the value of every yard, and carefully distributing the *minimum* to every house, and where will you find country homes, and that sense of generous freedom of air and space that make the charm of country life? In these two things Mr. Tayler Smith appears to us to have exercised a most wise discrimination; the trees are preserved on every hand, and the roadways intersect the park at such wide intervals that even were they all fronted with houses, the broad, open patches between would afford liberal views such as really savor of the country.

We notice first the detached houses, for there are yet comparatively few semi-detached houses built, and none in rows or terraces, except on the other side of the park, divided by the railway from the portion now illustrated. The houses vary considerably both in plan and elevation. One thing we may mention here, and that is, we are glad to observe an almost entire absence of those eccentricities and falsities of construction which so disfigure many of the houses erected on the Bedford Park estate. Vertical brick joints are tolerably well eschewed, and plaster panels, such as offer a ready development for green vegetation over their surface, we nowhere find. Moreover, there is less of the monotony of red, which, at all events in its younger state, spoilt the Bedford Park estate, and to a certain extent nullified its variety of picturesqueness in design. On several of the houses we find the roofs covered with tiles of a charming velvety brown, and admirably relieving the walls, which are of gray clinkers with red stock dressings. The best houses in the park (by a very long way) are those built first, exclusively from Mr. Tayler Smith's own designs. These are of a simple Gothic character and elegant in proportion; half-timber work is sparingly used, the upper portions, in gables and dormers, being chiefly filled with tile hanging. One of the best of these earlier homes is the one called "The Lodge" on our plate to-day. Coming next to a house which is simplicity itself, the one from Wellington Road, we have an expressive design that evidences the skill of the architect, along with very careful consideration of the builder's pocket. There is a row of ten of these little houses already built, and very pretty they look when the sun shines diagonally along their front walls. We think they would have been more satisfactory by a greater projection of the eaves, and little steeper pitch to the roofs, but, as a whole, the result is good, and practical withal. Further on we may have to notice Athole Lodge, but the peep of it illustrated this week is a fair sample of many similarly charming bits in different parts of the park. The house from Queen Anne's Place, of which we give both front and back views, has its upper story covered with rough-cast, in which broken shells are used to produce a sparkling effect, admirably contrasting with the sober gray and red of the walls below. Not the least interesting part of our plates will be the plans, which evidence much thought for the comfort of the inmates, whilst avoiding useless expense of construction.

When we say that the sketches we illustrate are all made on the spot, with the utmost care for accuracy, and that no tree or outline is shown which does not exist, our readers will agree with us that there is much at Bush Hill Park which renders it an attractive place of residence, and that, with all the drawbacks and failures inevitable to so large an undertaking, there is to be found a large measure of successful effort which we may heartily congratulate.

TRANSVERSE STRENGTH OF TIMBER.[1]—IV.



NO. 15. — Spruce joist, 1¾″ x 6¾″; span = 7′; loaded at centre; cut at same time and same place as preceding.

Tested by Messrs. Johnson & Morrison.

Broke at 4785 pounds by tension.
Modulus of rupture = 7562 pounds per square inch.
Maximum intensity of shear at neutral axis = 304 pounds per square inch.

No. 16. — Spruce joist, 3″ x 9″; span = 6′ 8″; loaded at centre; from Bangor, Me., cut in 1882.

Tested by Messrs. Johnson & Morrison.

Broke at 9985 pounds by tension.
Modulus of rupture = 4931 pounds per square inch.
Maximum intensity of shear at neutral axis = 277 pounds per square inch.

No. 17. — Spruce joist, 3″ x 9″; span = 6′ 8″; load distributed at four points 16″ apart; from Bangor, Me., cut in 1882.

Tested by Messrs. Johnson & Morrison.

Broke at 16744 pounds by tension.
Modulus of rupture = 4961 pounds per square inch.
Maximum intensity of shear at neutral axis = 465 pounds per square inch.

No. 18. — Spruce joist, 3.9″ x 12″; span = 16′; loaded at a point 4′ 6″ from end; first-rate quality.

Tested by Messrs. Johnson & Morrison.

Broke at 12585 pounds at the point of application of the load by tension; slight compression also developed.
Modulus of rupture = 5218 pounds per square inch.
Maximum intensity of shear at neutral axis = 202 pounds per square inch.

No. 19. — Spruce joist, 2″ x 12″; span = 14′; loaded at centre; ordinary stock.

Tested by Messrs. Tompkins & Gustin.

Moment of inertia of cross-section about neutral axis = 288.

Loads in lbs.	Deflection in inches.	Differences.	Remarks.
485	.0000		
686	.0473	.0473	Rested over night.
510			Load on next morning.
485	.0000		Began new set of readings.
686	.0343	.0343	
887	.0825	.0482	
1088	.1284	.0459	
1088	.1309		After one hour.
1289	.1764	.0455	
3600	—	—	Cracks opened near centre above neutral axis. Bulging at top, east side.
4103	—	—	
4404	—	—	Breaking load. Fracture occurred within one hour after the application of the breaking load. Line of fracture followed the knots.

Modulus of rupture = 3854 pounds per square inch.
Mean deflection for 201 lbs. = .0465 inches.
Modulus of elasticity = 1482645 pounds per square inch.
Maximum shear along neutral axis at time of breaking = 138 " " " "

No. 20. — Spruce joist, 2″ x 12″; span = 14′; loaded at centre; not many knots.

Tested by Messrs. Tompkins & Gustin.

Moment of inertia = 288.

Loads in lbs.	Deflection in inches.	Differences.	Remarks.
485	.0000		
686	.0431	.0431	
887	.0885	.0454	
1088	.1303	.0418	
5813	—	—	Twisted badly in spite of bracing, and load fell off rapidly, it being impossible to keep load on.
5108	—	—	Breaking load.

Modulus of rupture = 4469 pounds per square inch.
Mean deflection for 201 lbs. = .0434 inches.

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[1] By Gaetano Lanza, Professor of Applied Mechanics, Massachusetts Institute of Technology. Continued from page 283 No. 416.

Modulus of elasticity = 1588548 pounds per square inch.
Maximum intensity of shear at neutral axis at time of breaking = 160 " " " "

No. 21.— Spruce joist, 3 15-16″ x 12″; span = 14′; loaded at centre; ordinary stock.

Tested by Messrs. Tompkins & Gustin.

Moment of inertia = 567.

Loads in lbs.	Deflection in inches.	Differences.	Remarks.
686	.0000		
1088	.0546	.0546	
1490	.1033	.0487	
1892	.1654	.0621	
2294	.2192	.0538	
2696	.2858	.0666	
3098	.3397	.0539	
3500	.4030	.0633	
3902	.4644	.0614	
4304	.5256	.0612	
4706	.5898	.0642	Left over night.
4203	.5845		Next morning.
4706	.6529		Load increased to 4706 again.
4404	——	——	Next day.
5610	——	——	Braced the stick.
8627	——	——	Breaking load after carrying 15 min.

Modulus of rupture = 3834 pounds per square inch.
Mean deflection for 403 lbs. = .0590 inches.
Modulus of elasticity = 1187073 pounds per square inch.
Maximum intensity of shear at neutral axis at time of breaking = 137 " " " "

No. 22 — Spruce joist, 3⅞″ x 12″; span = 14′; loaded at centre; first quality; lower part of tree, very free from knots; had been seasoning on the wharf about one year.

Tested by Messrs. Tompkins & Gustin.

Moment of inertia = 558.

Loads in lbs.	Deflection in inches.	Differences.	Remarks.
485	.0000		
887	.0534	.0534	
1289	.1052	.0518	
1691	.1583	.0531	
2495	.2665	.1082	
3299	.3748	.1083	
4103	.4810	.1062	
4907	——	——	Left over night.
4203	——	——	Next morning.
12545	——	——	Breaking load. Beam broke by tension and afterwards by shearing along the neutral axis. Shear extended from centre to one end, and pieces slid by one another about 7-16″.

Modulus of rupture = 5666 pounds per square inch.
Mean deflection for 402 lbs. = .0534 inches.
Modulus of elasticity = 1332715 pounds per square inch.
Maximum intensity of shear at neutral axis at time of breaking = 202 " " " "

No. 23.— Spruce joist, 3⅞″ x 12¼″; span = 14′; loaded at centre. *N. B.*— Upper half of preceding specimen, which was originally 30′ long, very knotty.

Tested by Messrs. Tenney & Mansfield.

Moment of inertia = 593.6+.

Loads in lbs.	Deflection in inches.	Differences.	Remarks.
485	.0000		
887	.0819	.0819	
1289	.1457	.0638	
1691	.2204	.0747	Left over night.
1425	——	——	Next morning.
1691	.2569		Raised load again.
2093	.3269	.0700	
2495	.4017	.0748	
2897	.4828	.0811	
3299	.5536	.0708	
4103	.7073	.1537	
4907	——	——	Left on for half an hour, during which time the load fell off to 4203, beam splitting and cracking at a large knot on lower edge, near centre of span.
4203	——	——	
6917	——	——	Breaking load. Knot causing break was about 15″ from centre.

Modulus of rupture = 2995 pounds per square inch.
Mean deflection for 402 lbs. = .0745 inches.
Modulus of elasticity = 897961 pounds per square inch.
Maximum intensity of shear at neutral axis = 108 " " " "

No. 24.— Spruce joist, width = 3 1-16″ at bottom, 2⅞″ at top; depth = 11⅞″; span = 14′; loaded at centre; not many knots.

Tested by Messrs. Scott & Foran.

Moment of inertia = 414.2+.

Loads in lbs.	Deflection in inches.	Differences.	Remarks.
485	.0000		
887	.0603	.0603	
1289	.1247	.0644	
1691	.1835	.0588	
2093	.2485	.0650	Left fifteen hours.
1766	——	——	Load at end of that time.
2093	.2742	——	
2495	.3285	.0543	
2897	.3870	.0585	
3299	.4521	.0651	
3701	.5189	.0668	
4103	.5746	.0557	
8927	——	——	Breaking load. Broke by shearing along neutral axis, split opening about 1⅛″.

Modulus of rupture = 5442 pounds per square inch.
Mean deflection for 402 lbs. = .0610 inches.
Modulus of elasticity = 1572470 pounds per square inch.
Max. shear at neutral axis = 190 " " " "

No. 25.— Spruce joist, 2″ x 9¾; span = loaded at centre; ordinary stock.

Tested by Messrs. Scott & Foran.

Moment of inertia = 154 4.

Loads in lbs.	Deflection in inches.	Differences.	Remarks.
485	.0000		
887	.1625	.1625	
1289	.3342	.1717	
1691	.5280	.1938	
3198	——	——	Breaking load, broke by compression at top and by tension at bottom.

Modulus of rupture = 4239 lbs. per square inch.
Mean deflection for 402 lbs. = .1760 inches.
Modulus of elasticity = 1460620
Max. intensity of shear at neutral axis = 123 lbs. per square inch.

No. 26.— Spruce joist, 2¾″ x 12″; span = 14′; loaded at centre; ordinary stock.

Tested by Messrs. Tenny & Mansfield.

Moment of inertia = 396.

Loads in lbs.	Deflection in inches.	Differences.	Remarks.
485	.0000		
887	.0534	.0534	
1691	.2050	.1516	
2495	.3610	.1560	
3299	.5025	.1415	
5610	——	——	Cracked somewhat.
5713	——	——	Cross-grained fibres at bottom tore apart.
5914	——	——	Sharp crack heard and a long split appeared,
6819	——	——	Breaking load.

Modulus of rupture = 4339 lbs. per square inch.
Mean deflection for 402 lbs. = .0718 inches.
Modulus of elasticity = 1396667 pounds per square inch.
Max. intensity of shear at neutral axis = 155 " " " "

ILLICIT COMMISSIONS.

To the Editors of the American Architect:—

Gentlemen,—The quotation from *Truth* and the letters accompanying it, in your issue of December 15, must provoke comment from many persons interested in America as deeply as in England in one of the prominent questions of professional integrity. It is evident that *Truth's* intentions are good, at least superficially, but it is equally evident that the accusations are, as the Secretaries of the R. I. B. A. assert, "calumnious and untrue," in regard to at least a large section of the architectural fraternity. In the view of the controversy as a local affair, it should be remembered that individual architects in England are much more closely allied in the Institute and other associations than is the case here in America, and that rules made by the incorporated body are to a greater extent binding in actual practice. The Royal Institute has a definite legal status. With this in mind there is more force discovered in the declaration of the Council that they desire names for action to be taken. The names furnished, the Institute *would* take action, and it would have a serious effect upon the individuals charged, or upon the publishers of *Truth*. The position taken by the editor that the revelation of names of guilty architects is impossible because other parties in the fraud would be incriminated, is utterly inconsistent with *Truth's* avowed motives as public censor, and reveals a spite focussed upon the architect rather than general condemnation of a wrong. Why should *Truth* not dare to attack both the parties to a denounced bribery transaction? The fact is, our scandal-hunting editor does not want to eat his words under the wholesome compulsion of British libel laws, and knows that any inquiries would disprove the assertions, at least so far as the profession at large is concerned.

So much for the local aspect. Now for the effect of these allegations upon us in America. As an architect in practice I know that it is important to us also, especially since you, representing the architectural profession in America, have so boldly published the accusations, to be read by a great number not only of architects, but of employers and the public generally, who consult your pages; and the greater the publicity the better all honest architects will like it. This is not simply a clamor raised by one man; it is a common, popular accusation based upon certain undeniable facts finding voice, and no non-architectural reader will see those words without believing them, unless the other side of the argument is ably presented. If such charges are not met our reputation will suffer almost as much as that of the men originally impeached, for no one can fail to recognize the parallelism of circumstances, so exact that the mere repetition in your and other columns is as suggestive to American readers as would be an original accusation; therefore I urge the necessity of proving, first, that of the honest majority of architects the charge is false; and, second, that it is the desire of the profession to purify itself of the unsavory exceptions.

It cannot be denied that there are some men in every occupation who receive "illicit commissions" without thinking it dishonest, but I assert most emphatically, for myself and a great many more architects, that we have never received anything in money or otherwise

on account of professional position. except the properly charged remuneration paid by employers. I have been offered commissions by agents of apparently reputable firms, and therefore I infer that they are sometimes accepted; but I do not positively know of one such acceptance, so it is either very rare or very secret. Who takes such payments? We hear occasionally of very low rates of remuneration offered to, and accepted by architects; two per cent, perhaps, instead of five. The employer who feels that he was too stingy in that matter may pacify his doubts with the assumption that the architect was well enough paid in the end, and of course the money came indirectly out of the same pocket. It is a fact that five per cent is none too high a compensation for artistic services, and he who seeks to avoid fair payment is partly responsible for the evils his meanness has led to.

Permit me to add to these statements some answers to the questions which terminate *Truth's* letter.

No. 1. Why the discount custom prevails? It was partly a provision for changing prices to accord with fluctuations of the great markets. It is impossible to issue long price-lists for every change, but it is easy to make these at a maximum, and to issue notes of varying discount rates. Doubtless, there is also a support to the custom in the weakness of humanity which finds ignorant gratification in seeing "something taken off" a bill even if it has been put on for that purpose. Another reason is that people resent any additions when distance, or inconvenience, or small and unbusiness-like orders render a high price necessary, so that the net-cash price is not a convenient one to announce to all buyers. On the whole it is a pernicious custom.

No. 2. Whether the members of the Institute are in blissful ignorance of the custom? This is only an impertinent bit of journalistic smartness and needs no answer.

No. 3. Whether they do not certify accounts without having discounts deducted? Certainly not. This charge refers mostly to day's-work accounts, and *net cost*, not catalogue price, is the basis. When an architect specifies an article for a contract, the builder, seeking to give an acceptable bid, will estimate upon the same basis, and neither he nor the architect will trouble himself with discount lists as a means of manipulation. If tiles are to be bought for two dollars per foot less fifty per cent, it simply means one dollar a foot, and if a builder makes estimates on the two-dollar basis he is wasting time; his object is to give the lowest bid and get the job, not to make up fancy prices which he will stand no chance of receiving. If he and the architect establish a dishonest collusion, there are less transparent ways of deceiving the employer than this.

No. 4. Whether architects do not invariably insert the names of firms allowing discounts, and whether in such cases the builder does not receive a smaller discount? As discounts are almost invariably part of the price-list arrangements, the architect has no choice in the first-named circumstance; but no such selection influences the discount allowed to builders, etc. Even if the architect, being dishonest, specifies an article because the manufacturer pays him to do so, that does not raise the price to the builder, but the payment is made out of the manufacturer's profit.

Architects often specify a name because only that firm supplies the article wanted, such as Low's tiles or Yale locks, but it is not to be inferred that they are bribed. It is impossible to describe the desired production better than by using the maker's name, and sometimes this may be done regarding things which are not specialties, as for instance, in specifying Corliss's hardware, or Mott's plumber's castings, but a decent architect will add the words, or "equal approved," and will permit any such equally good manufacture to be used; and a good architect is usually anxious to get all the money possible spent upon the *building*, not upon the builder in payments of 12*s*. for 6*s*. paper.

As the editor remarks, the subject is one of considerable interest. In fact, it is a subject we cannot afford to let drop quietly now it is aroused. Will you not invite expressions of opinion in the *American Architect* by architects, and employers, too; by any one, in fact, as to the possibility of suppressing the dishonesty which, as I have admitted, we know is perpetrated by some among us. The public would not have greater satisfaction in calling them to account than would I, even if stringent laws, declaring such "customs" illegal and imposing penalties as upon other forms of robbery, could be obtained.

Lastly (and in this I address you, Messrs. Editors), what is your advice to those individuals who desire purity in their dealings, if they see these things pass uncontradicted, and find themselves classified with those who do not deny because they cannot. If every man assumes that we take underhand commissions and smiles cynically when we assure him we do not; if further, we decline a certain class of discounts with the knowledge that the manufacturer, not the employer, pockets the bribe declined; if we are poorly paid and little esteemed, instead of being sought as artists and honest men, are we to be martyrs in a hopeless cause of public morality, or are we to come down from the pedestal, and pocket the gains which the public insist upon scoring to our accounts.

Yours obediently, Robert W. Gibson.

[We were not conscious of practising any special "boldness" in publishing the correspondence to which our correspondent refers, but it seemed worth while to show that others than ourselves disbelieved in the existence of a common practice of receiving illicit commissions of any kind. The existence in the minds of the public of the belief that architects do receive illicit commissions is due, we believe, entirely to the action of dealers who seek to bring about such a state of things by issuing broadcast to the profession circulars, more or less tempting, offering cash commissions for all trade coming through the architect's good offices. A circular of this kind falling into the hands of a client may well awaken distrust, but what is the proof that this is anything more than an unsuccessful attempt to secure trade? Would the circular of a medical quack offering to pay money to those doctors who would use his adulterated drugs cause a sick man to lose faith in his family physician and denounce the whole fraternity as frauds? Mercantile honor, or rather morality, is a thing *sui generis*, and in trade a man will, for money gain, create opportunities for others to do things which he himself would scorn to do. We believe that the attempts of trades-people to bribe are at the bottom of the whole outcry. We have heard for a long time these whispered charges, we have seen the printed and written offers of tradesmen, but we have never known of an authentic case in which an architect accepted such offers — nay more, we have never heard an architect's name mentioned or even hinted at as a bribe-taker by the most vociferous of those who find a gain or amusement in making the charges which we seek to refute. We are surprised that the writer of so well-reasoned a communication as is Mr. Gibson's should have seen fit to close it with such ill-considered questions. To accept an illicit commission in any form, however well disguised, is either right or it is wrong, and we believe Mr. Gibson and the many others like him will have no difficulty in regulating their own conduct without considering how the real or supposed misconduct of others conduces to their worldly advantage or disadvantage. — Eds. American Architect.]

A QUESTION OF FEE.

December 3, 1883.

To the Editors of the American Architect: —

Gentlemen, — Will you please give me your opinion through your columns on the following points?

About a year ago I made plans for, and superintended the erection of a store for a party here: a short time ago I asked for settlement, I only charging five per cent when I was entitled to at least six per cent, for the work came to less than $5,000; there were also considerable alterations and additions to a store adjoining, which was included in the above and considered as one job; but regarding him as a friend I made the charge low. When he examined my bill, he refused to allow me commission on stone pavement, fire-proof vault-door, iron railing about stairway in sidewalk, heater in the bath-room in basement, and several other items, claiming that I was only entitled to commission on the amount of the contract. They were all shown on the drawings and specified, they were not included in the contract as he preferred to furnish them himself; the sidewalk was originally intended to be of wood and be provided by the contractor; but before the contract was let, the specifications were altered so that they read "sidewalk will be of four-inch flagging, and will be laid by the owner."

During the progress of the work, a water-closet and some other plumbing was added, that was not contemplated at the time of writing the specifications; it was all done under my supervision, and I was consulted as to details throughout until the building was completed; once in particular, I remember, I was sent for to go and examine the water-closet he had selected, and at my suggestion one of better quality was procured. The heater was located on the plan, and minutely described in the specifications, and was an essential feature in the plumbing system, as the basement was intended for a public bath-room, to be run in connection with a barber shop.

The iron railing was shown on plan and elevations, was described in specifications, and I gave him the dimensions to order by. The vault door was necessary to enclose the vault we built; specifications said owner would furnish it and that contractor was to set it. Our relations were pleasant and amicable throughout the progress of the work, and have continued so until I rendered my bill, which was based upon the whole cost of the work, to him, when he refused payment as above stated; he also refused to inform me of the cost of the items he furnished, protesting that I had no right to claim commission on anything but amount of contract. I asked him where my pay was to come from if he had chosen to have had all the work done by the day, and thus have had no contract?

I have been thus minute that you might clearly understand the situation, and now I wish to know if I am not right in my demands? Hoping you will favor me with an answer in an early issue,

I am very respectfully yours, J. S. M.

["J. S. M." is quite right. He would probably have found less difficulty in collecting his bill if he had charged the regular rate. — Eds. American Architect.]

De Lesseps a Scotchman by Descent.— Scotchmen will be more than ever convinced that no good thing can come out of any place south of the Tweed by the results of the genealogical researches which M. de Lesseps has just made known. Like so many other Frenchmen, he is really, it seems, a Scotchman. In Scotland there were many Lasseps and Lessels, Lesseps and Lassels, while in France there were none of his name except himself and his own family. One of his direct ancestors was with James II, at St. Germain, and it was at that time that his family settled in France. The discovery of his Scotch origin seems to have made a great impression on M. de Lesseps, for he referred to the matter at considerable length twice over during his visit to Newcastle; and, indeed, some of the details are highly interesting from the point of view of hereditary genius. M. de Lesseps is proud of being a diplomatist; and the conduct of one of his ancestors who was ordered to arrest Henry IV, of France, but who, instead of arresting the king, forewarned him of his danger, may perhaps be taken to show that diplomacy runs in the family. So, again, although M. de Lesseps modestly disclaims being himself in any sort an engineer, it is interesting to know that one of his ancestors followed a technical profession, and that, according to vestry records still preserved, the Cathedral of Edinburgh was built by an architect named Lesseps.— *Pall Mall Gazette.*

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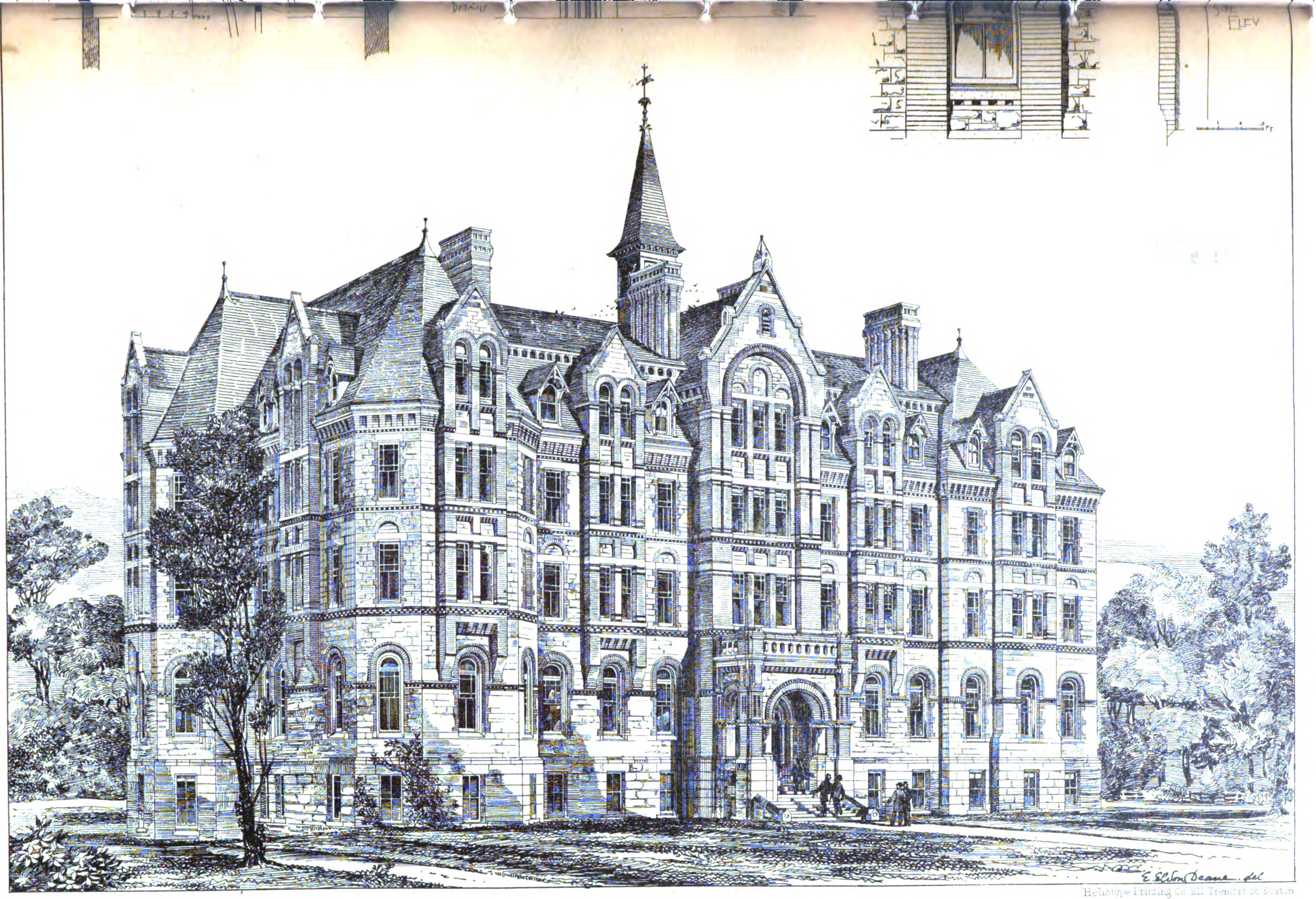

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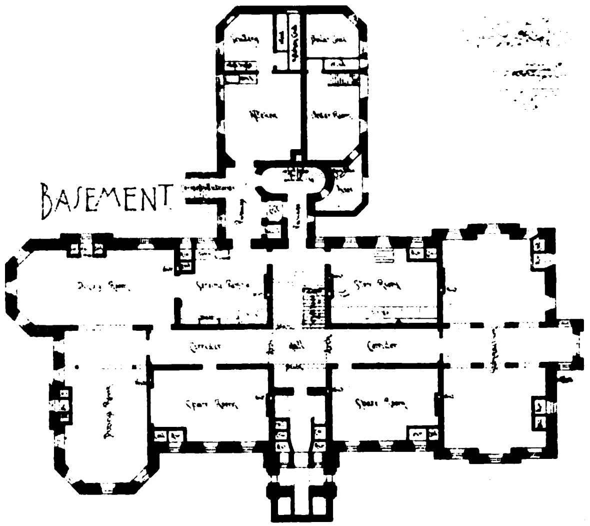

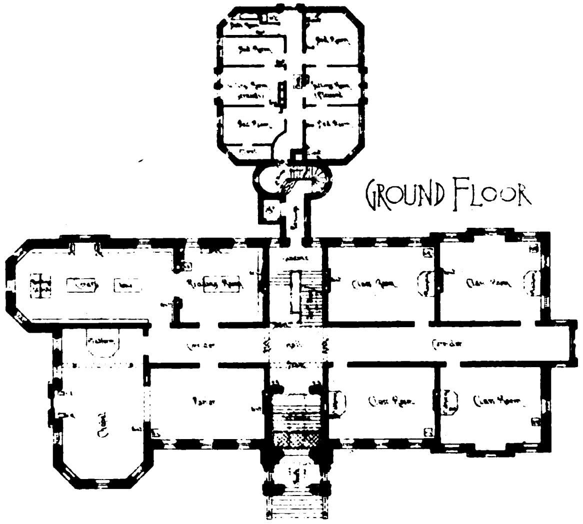

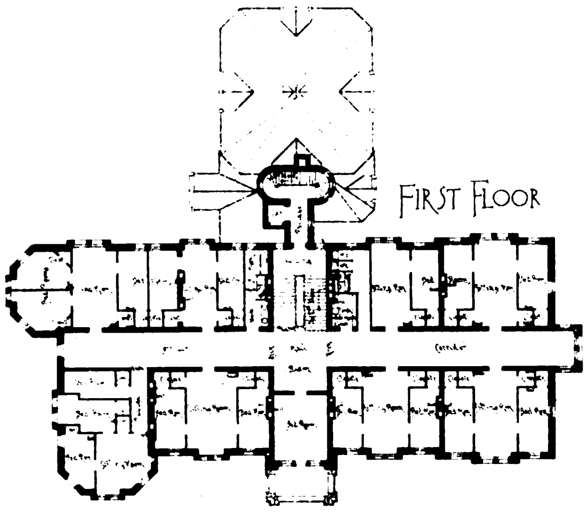

BAPTIST THEOLOGICAL COLLEGE, TORONTO, CANADA.

Messrs. LANGLEY, LANGLEY, & BURKE
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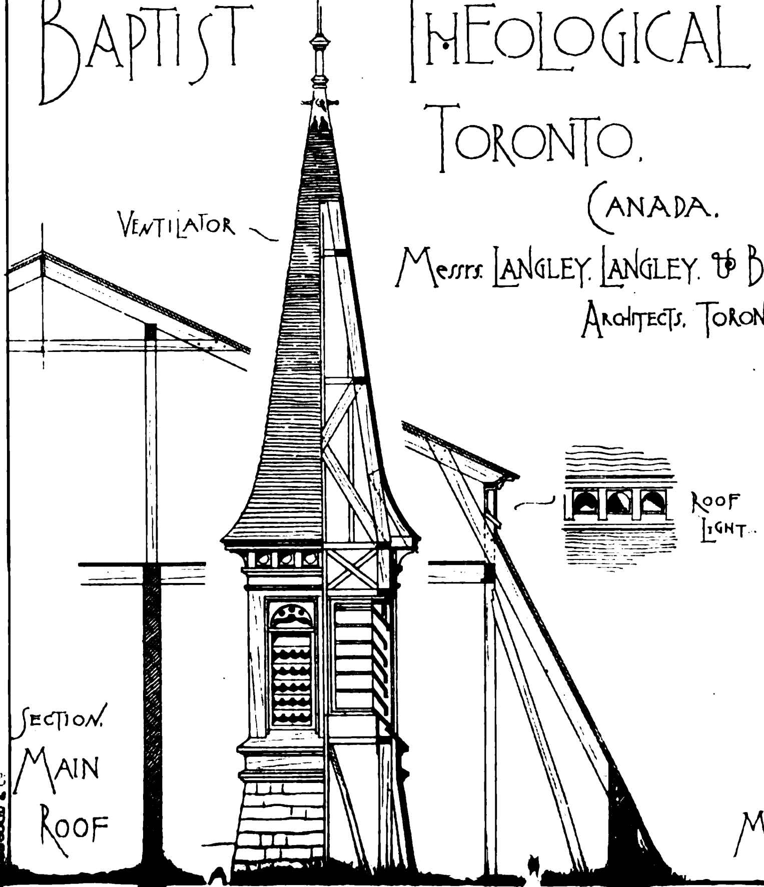

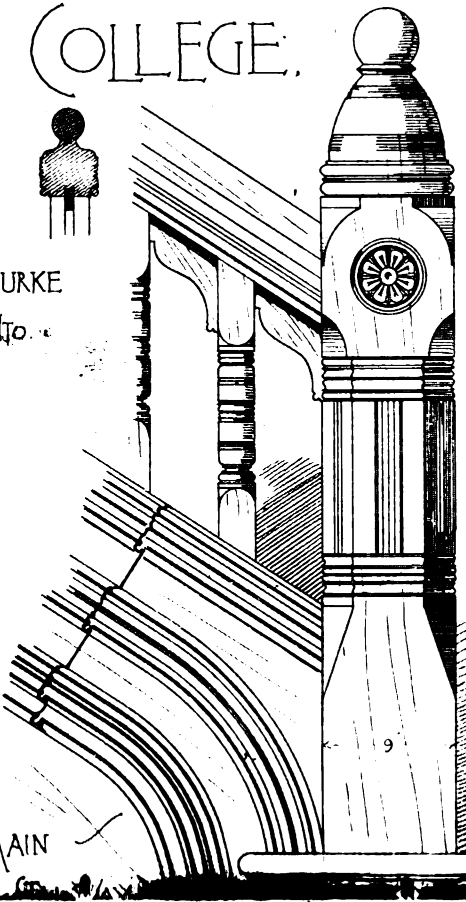

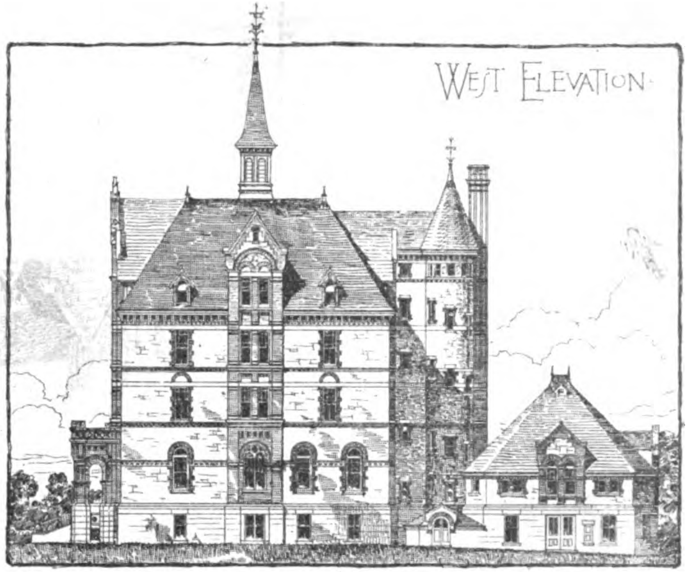

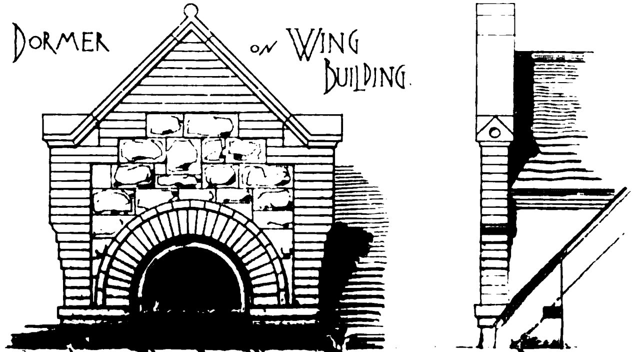

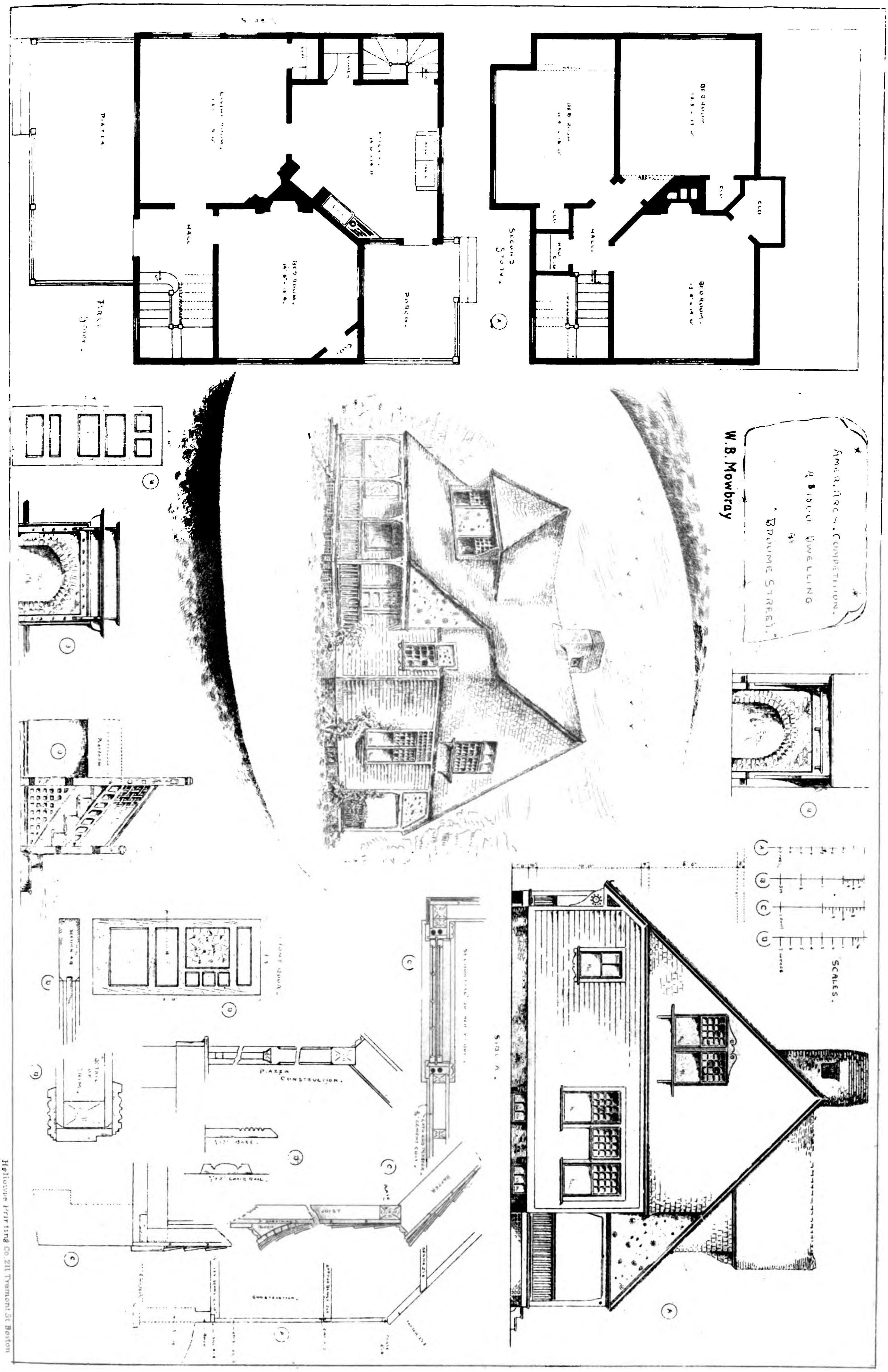
Amer. Arch. Competition.
A $1500 Dwelling
by
"Broome Street."
W. B. Mowbray
First Story
Second Story
Piazza
Porch
Hall
Bedroom
Side A.
Scales.
Front Door.
Piazza Construction.
Detail of Trim.
Joist
Rafter
Construction
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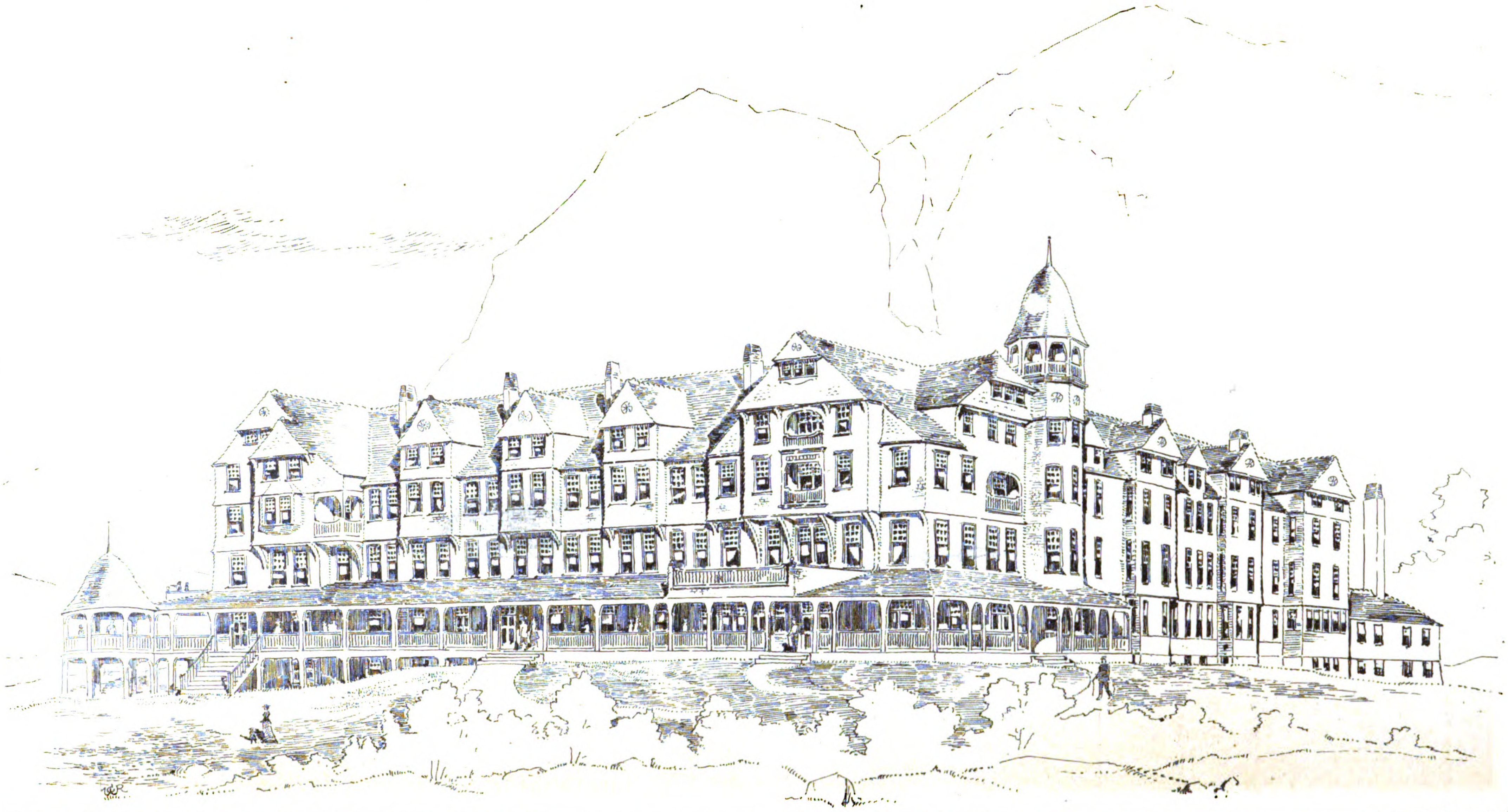

Design for Hotel at Mt Kineo Maine ⁂ Hartwell and Richardson Architects Boston Mass

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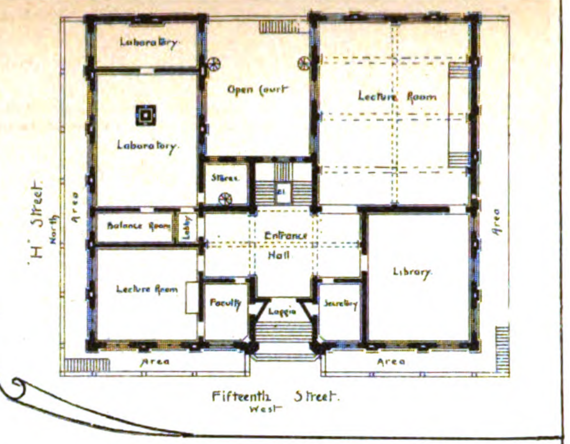
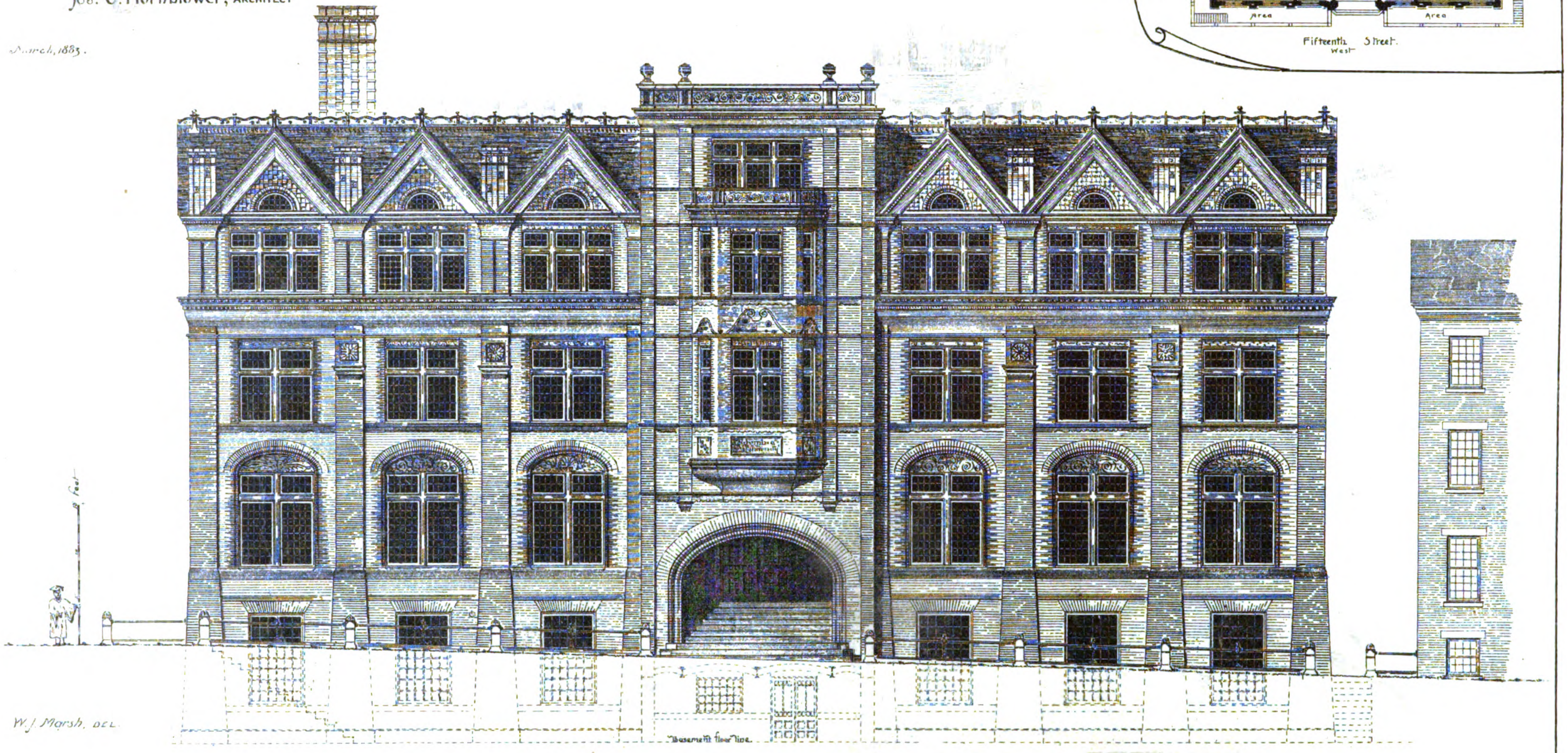
Competitive Design for the Columbian University ··· Washington · D · C ·

Submitted by
Jos. C. Hornblower, ARCHITECT

March, 1883.





W. J. Marsh, del.

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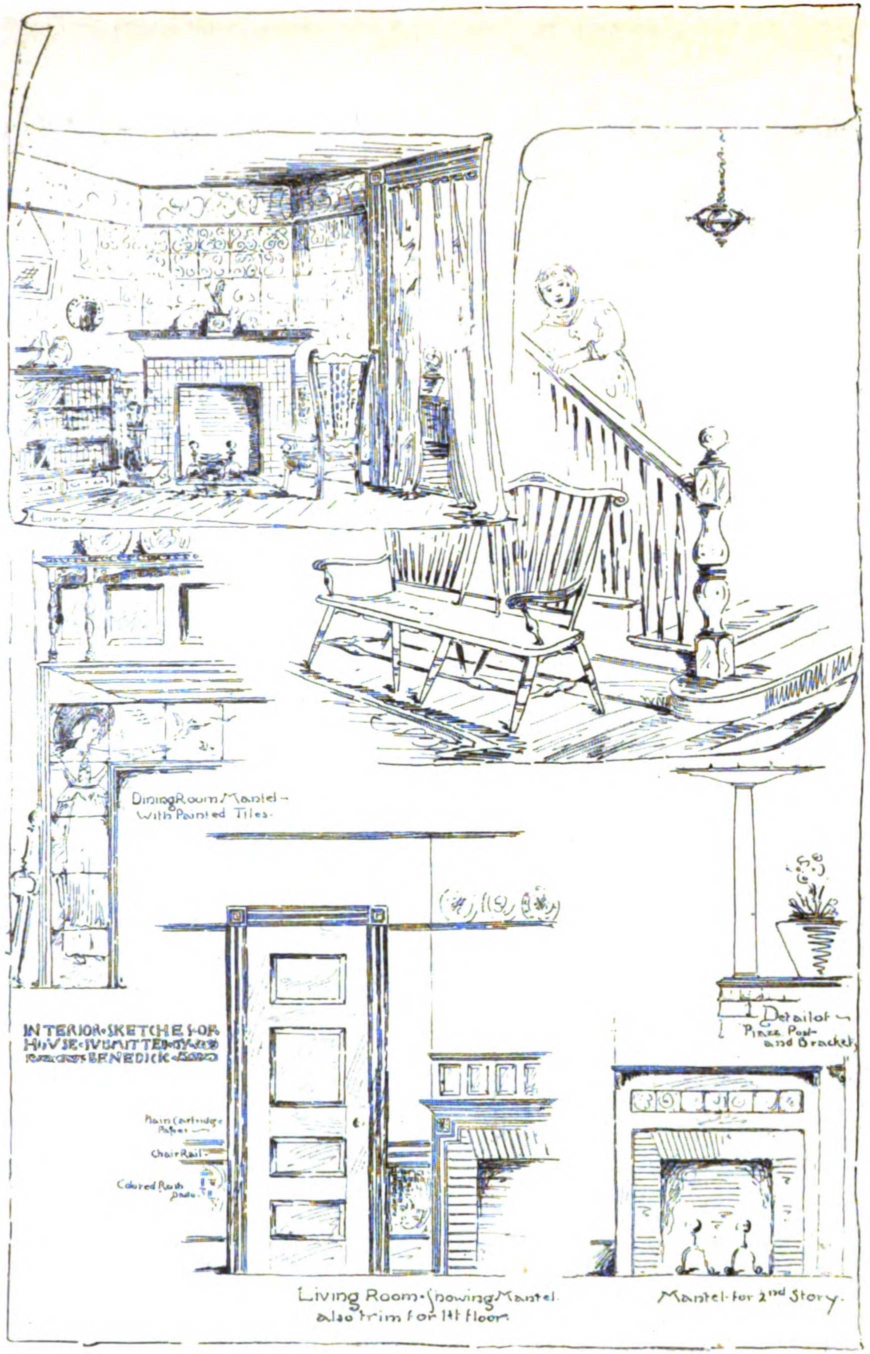

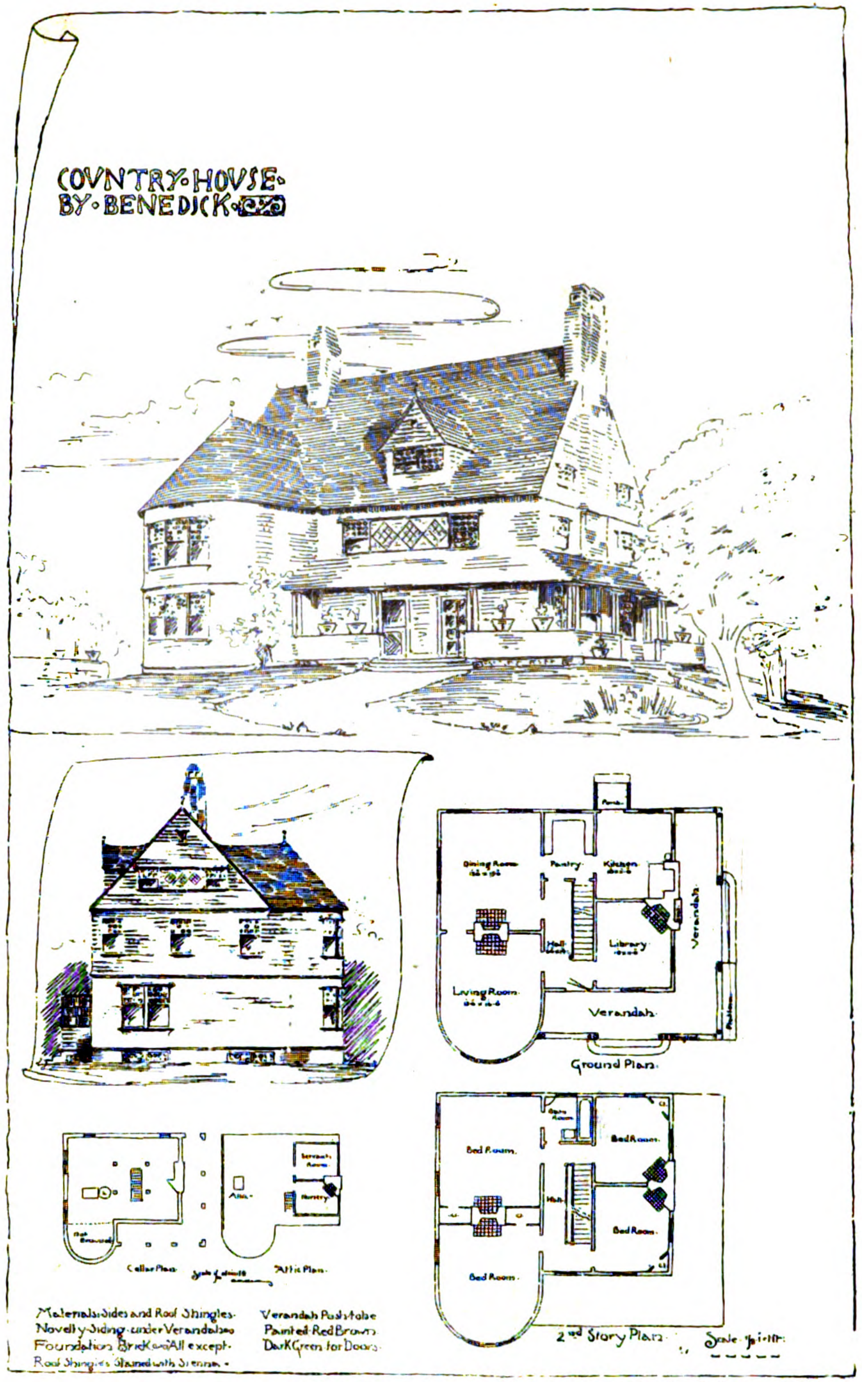

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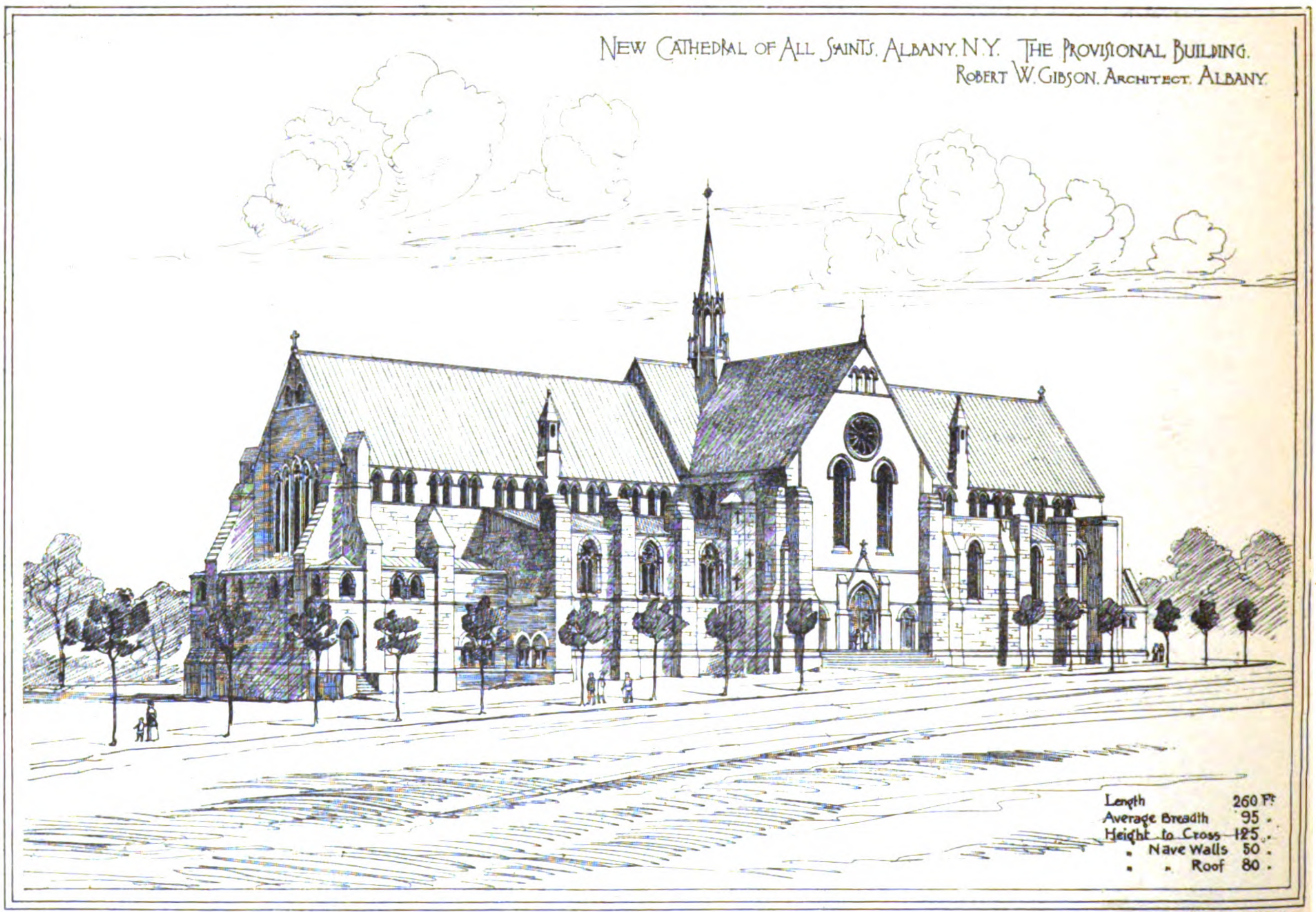
NEW CATHEDRAL OF ALL SAINTS. ALBANY. N.Y.

THE PROVISIONAL DESIGN. INTERIOR LOOKING EAST.

R.W. GIBSON. ARCHITECT. ALBANY.



NEW CATHEDRAL OF ALL SAINTS. ALBANY. N.Y. THE PROVISIONAL BUILDING.
ROBERT W. GIBSON. ARCHITECT. ALBANY.

Length	260 Ft
Average Breadth	95 .
Height to Cross	125 .
" Nave Walls	50 .
" " Roof	80 .

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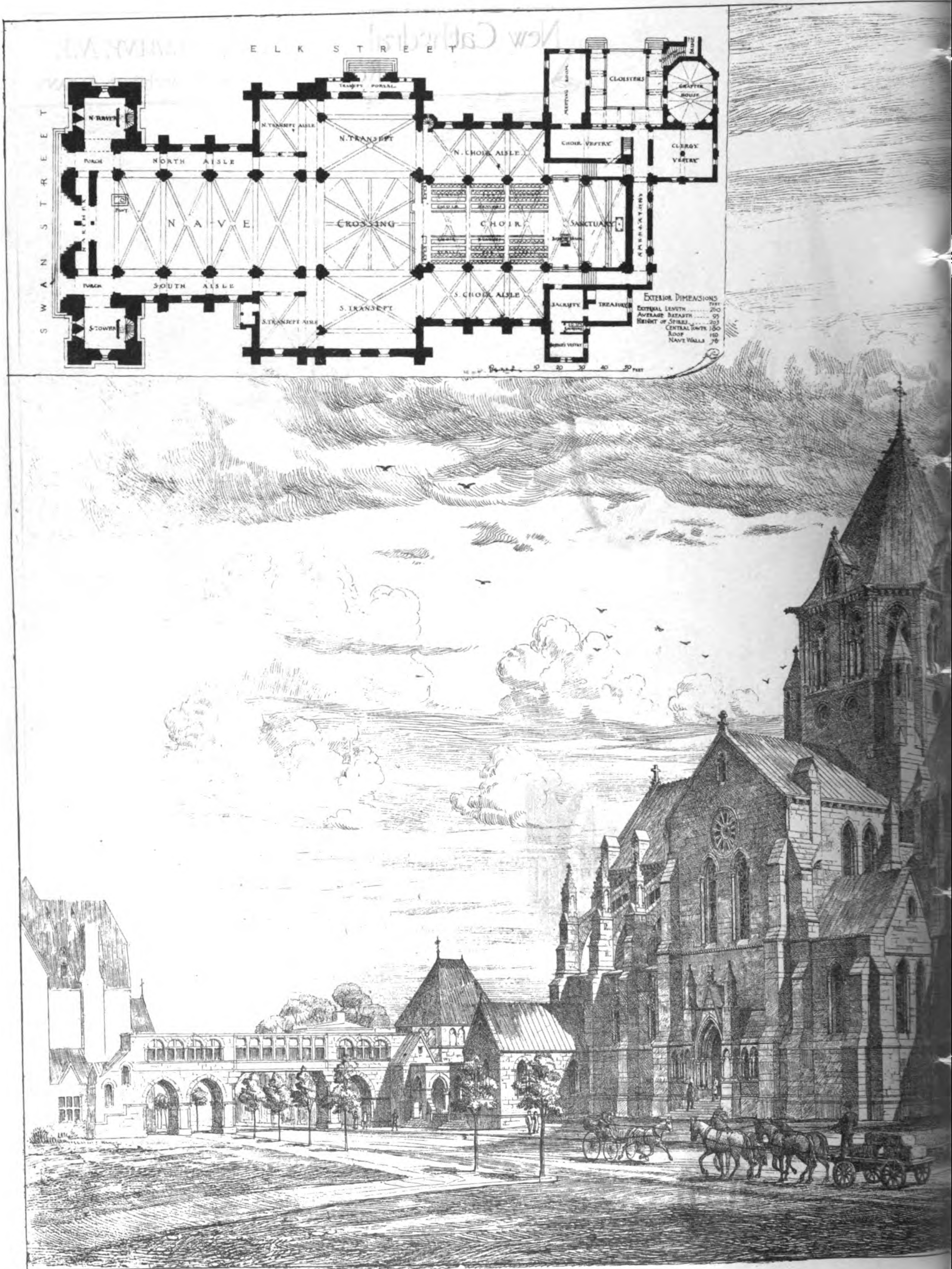

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New Cathedral of All Saints, ALBANY, N.Y.

Robert W. Gibson, Architect. ALBANY.

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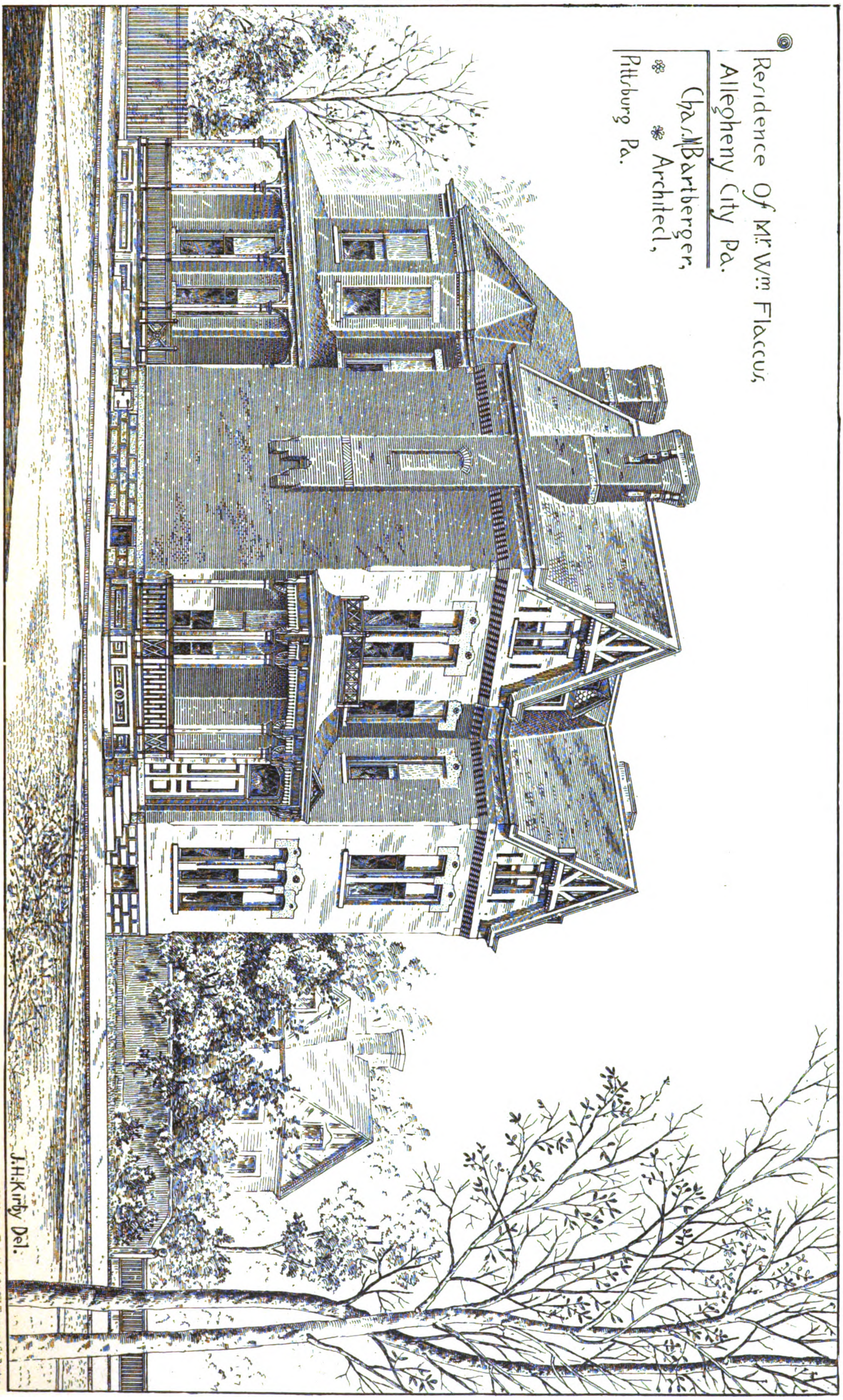

Residence Of Mr Wm Flaccus,
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Chas. M. Bartberger, Architect,
Pittburg Pa.

J. H. Kirby Del.

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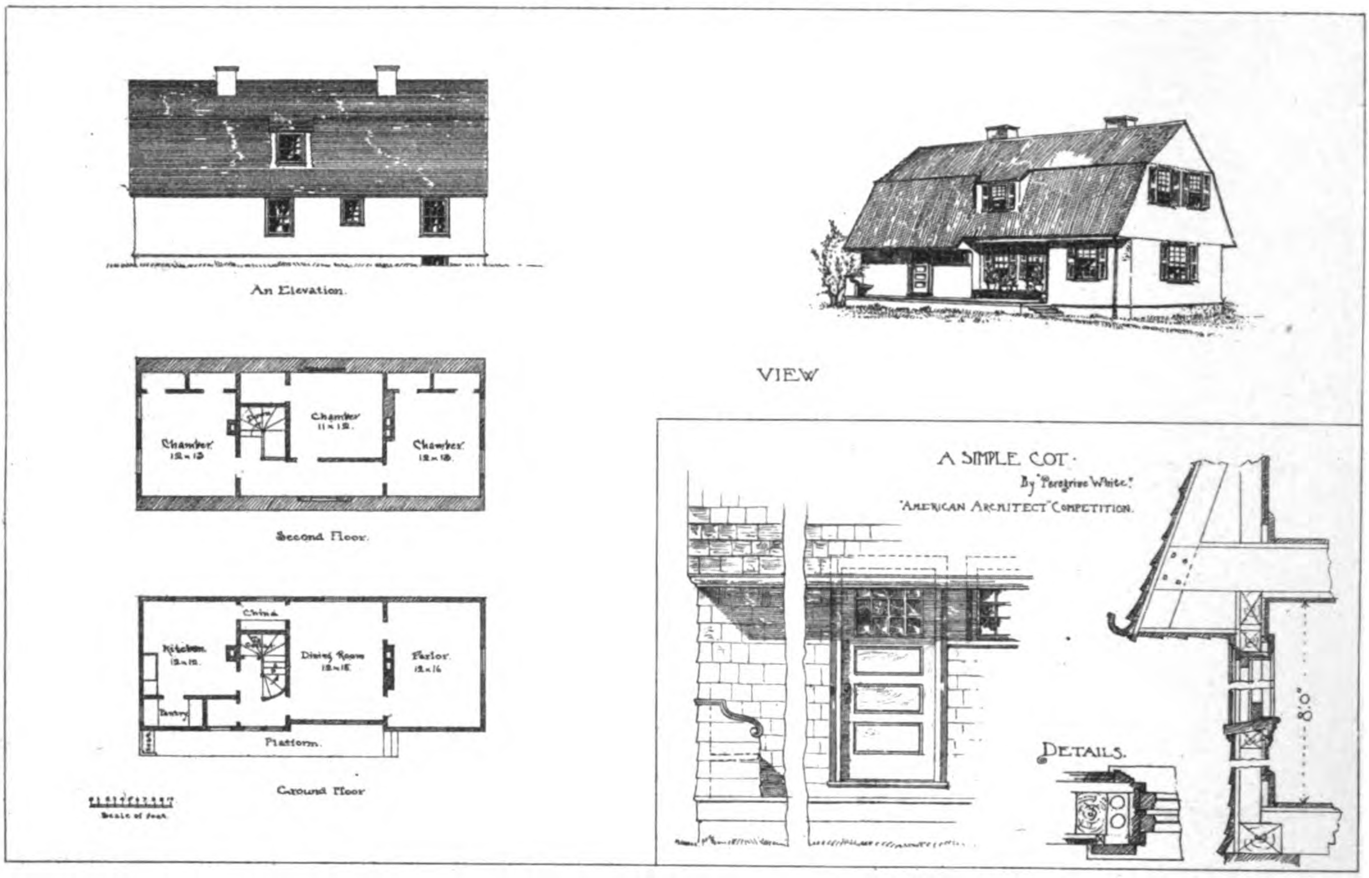
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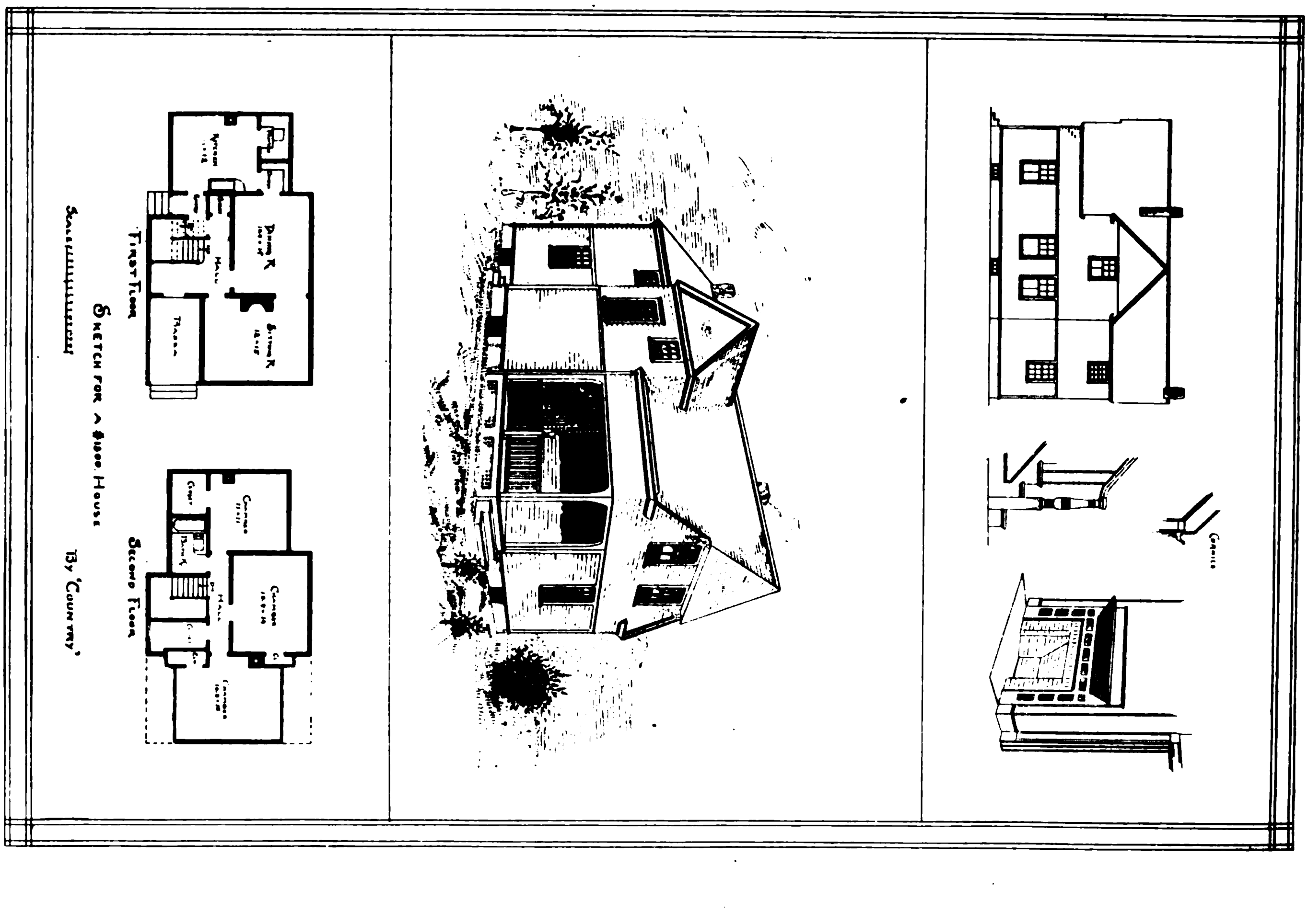
Sketch for a $1000. House By 'Country'

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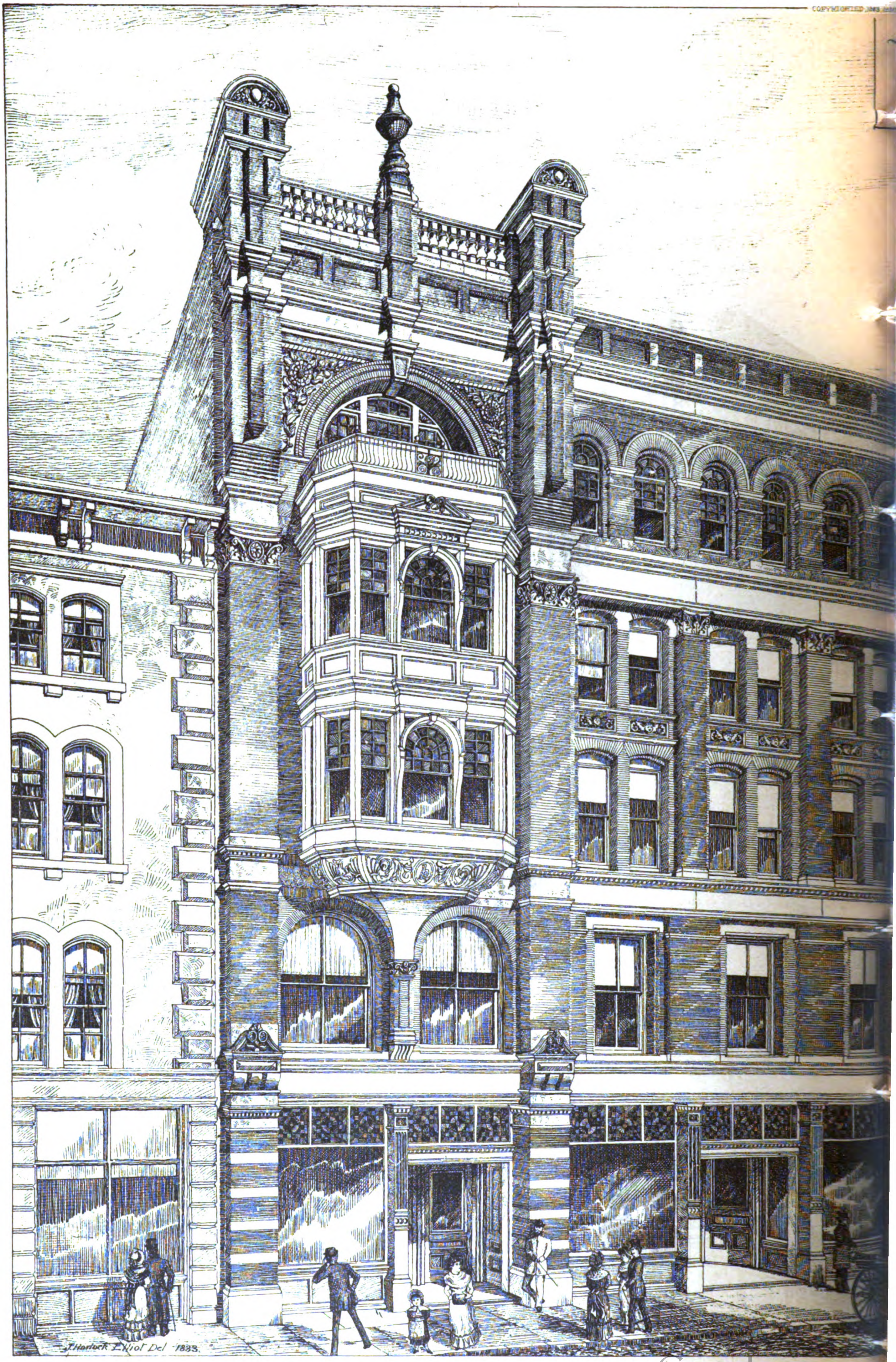

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Van Brunt & Howe · Architects · 60 Devonshire St · Boston

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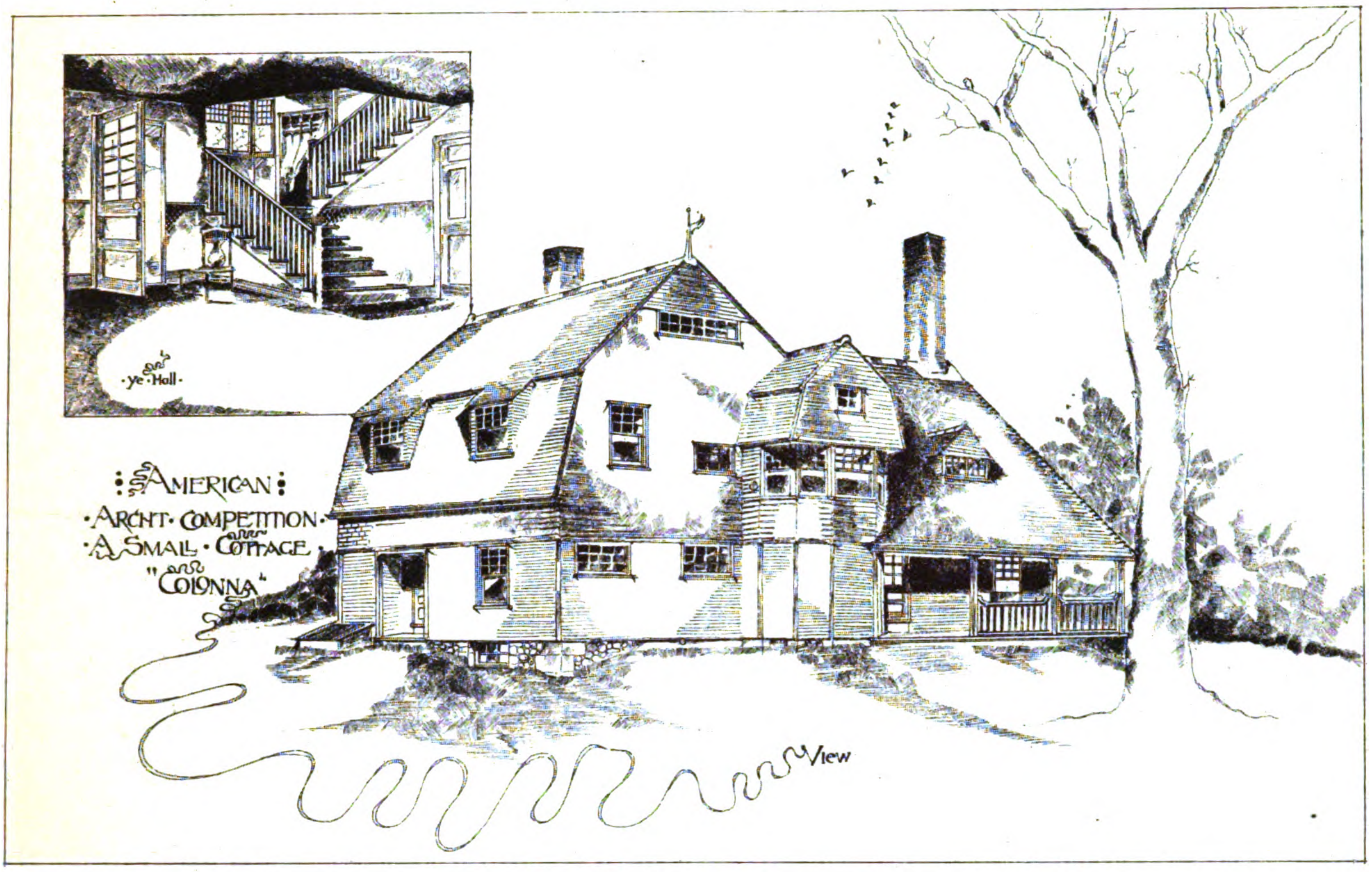

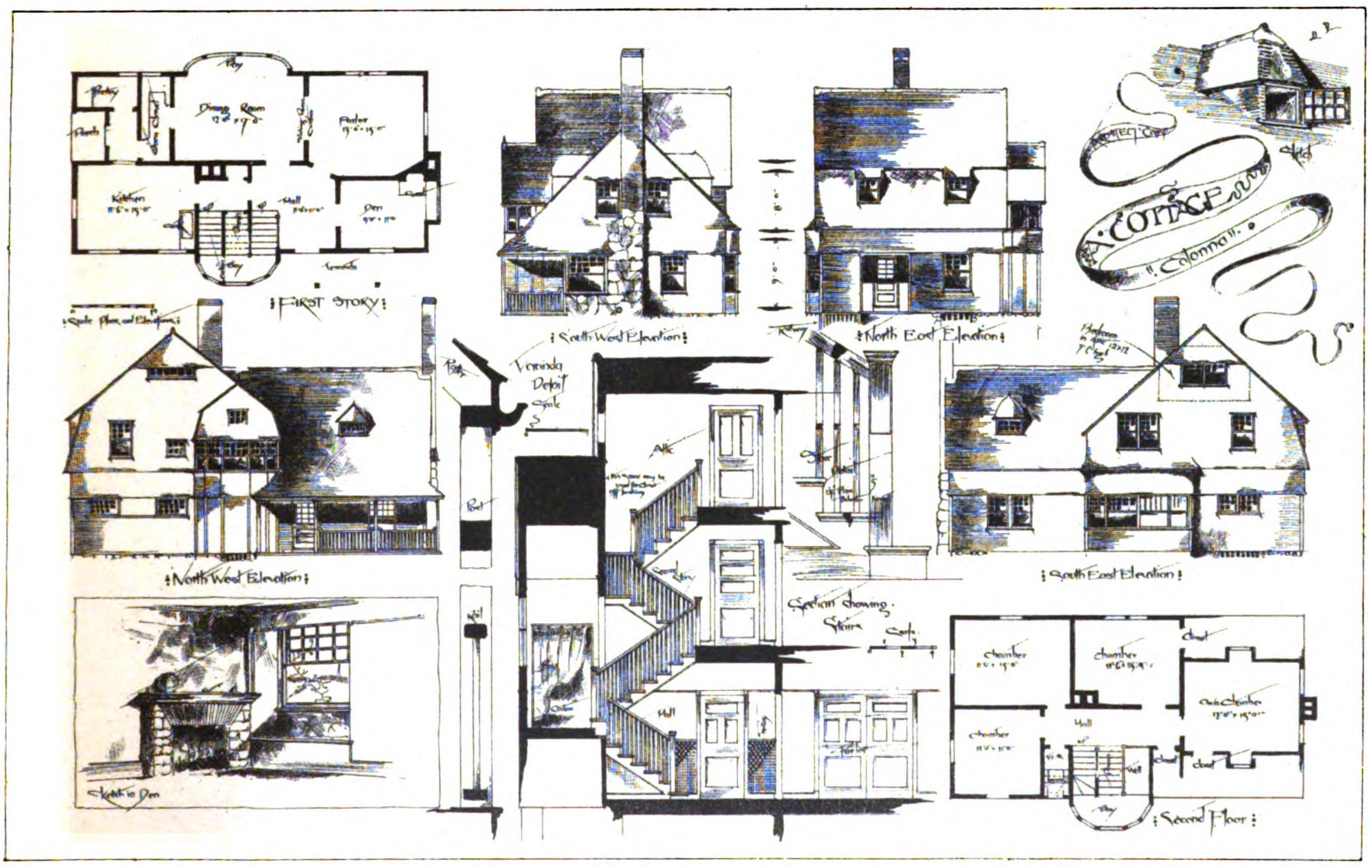

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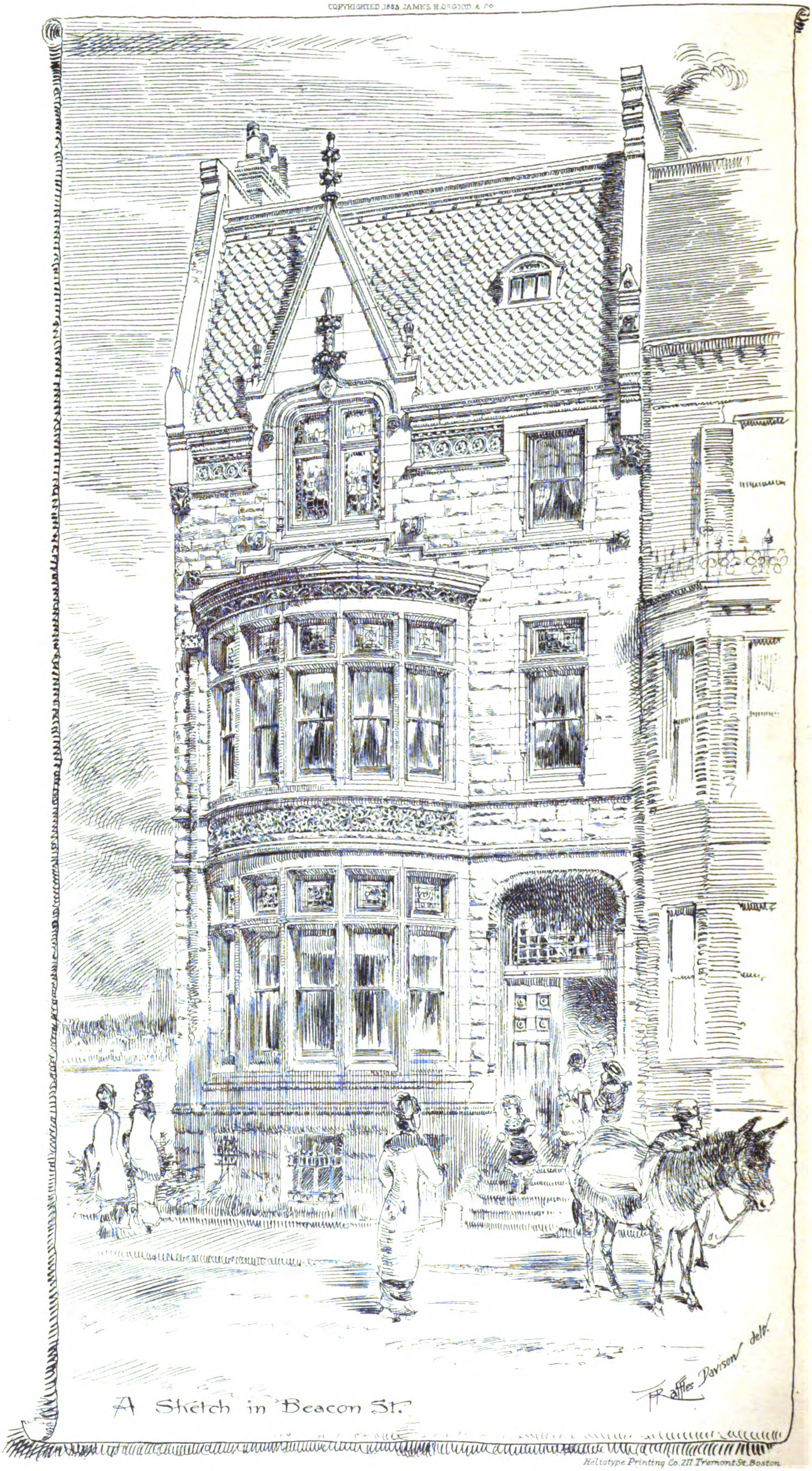

A Sketch in Beacon St.

F Raffles Davison delt.

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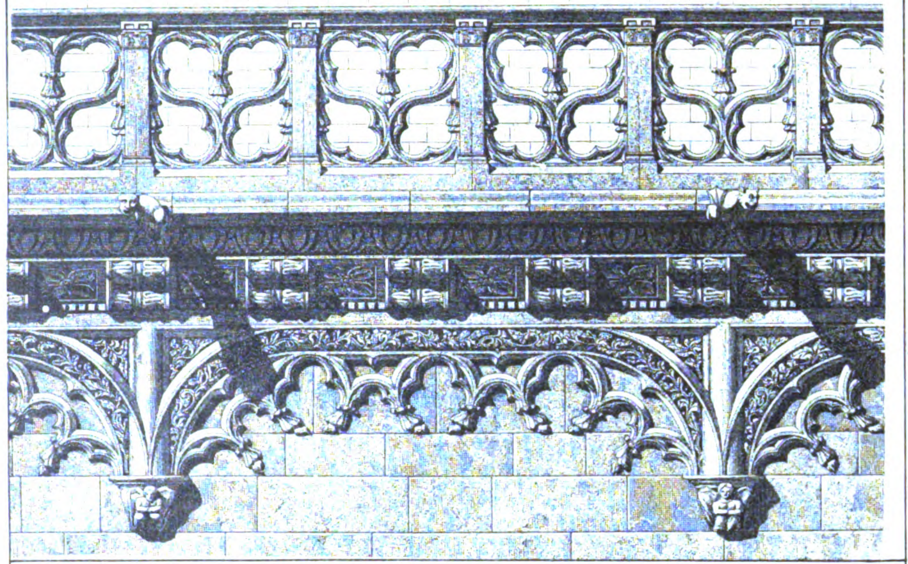

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Moniteur des Architectes.

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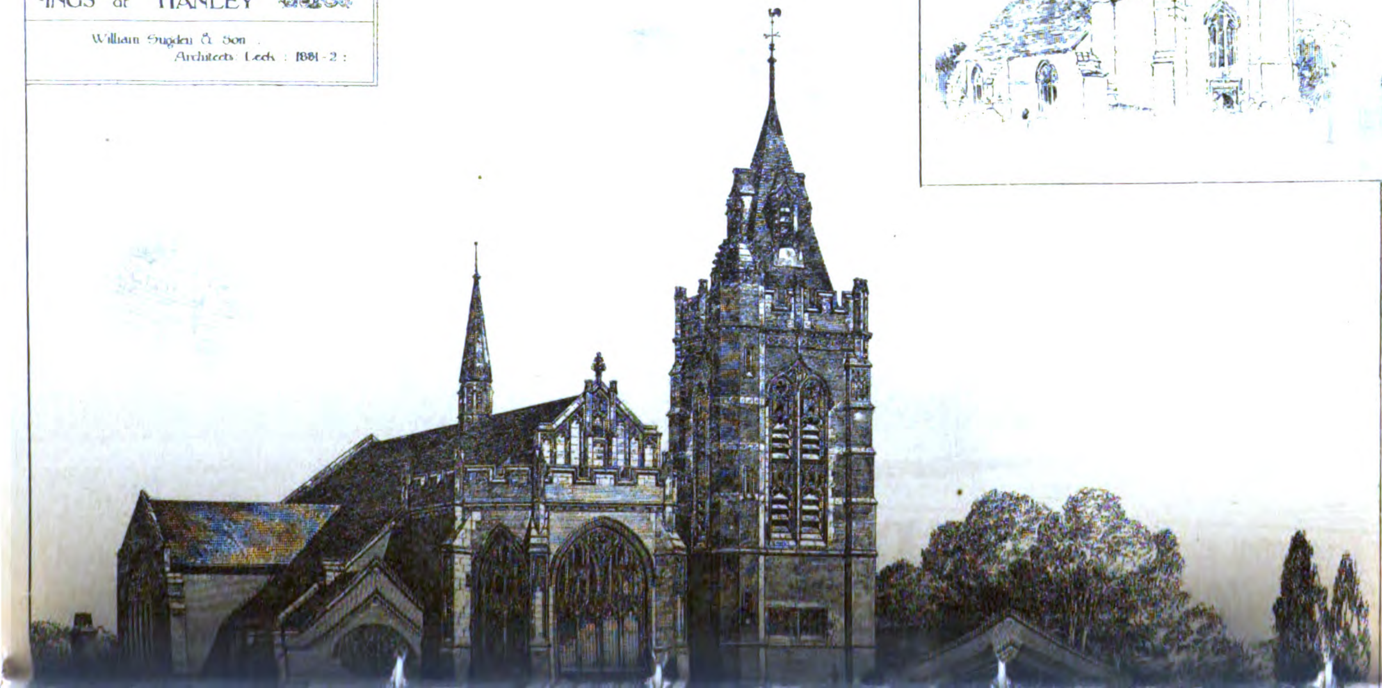

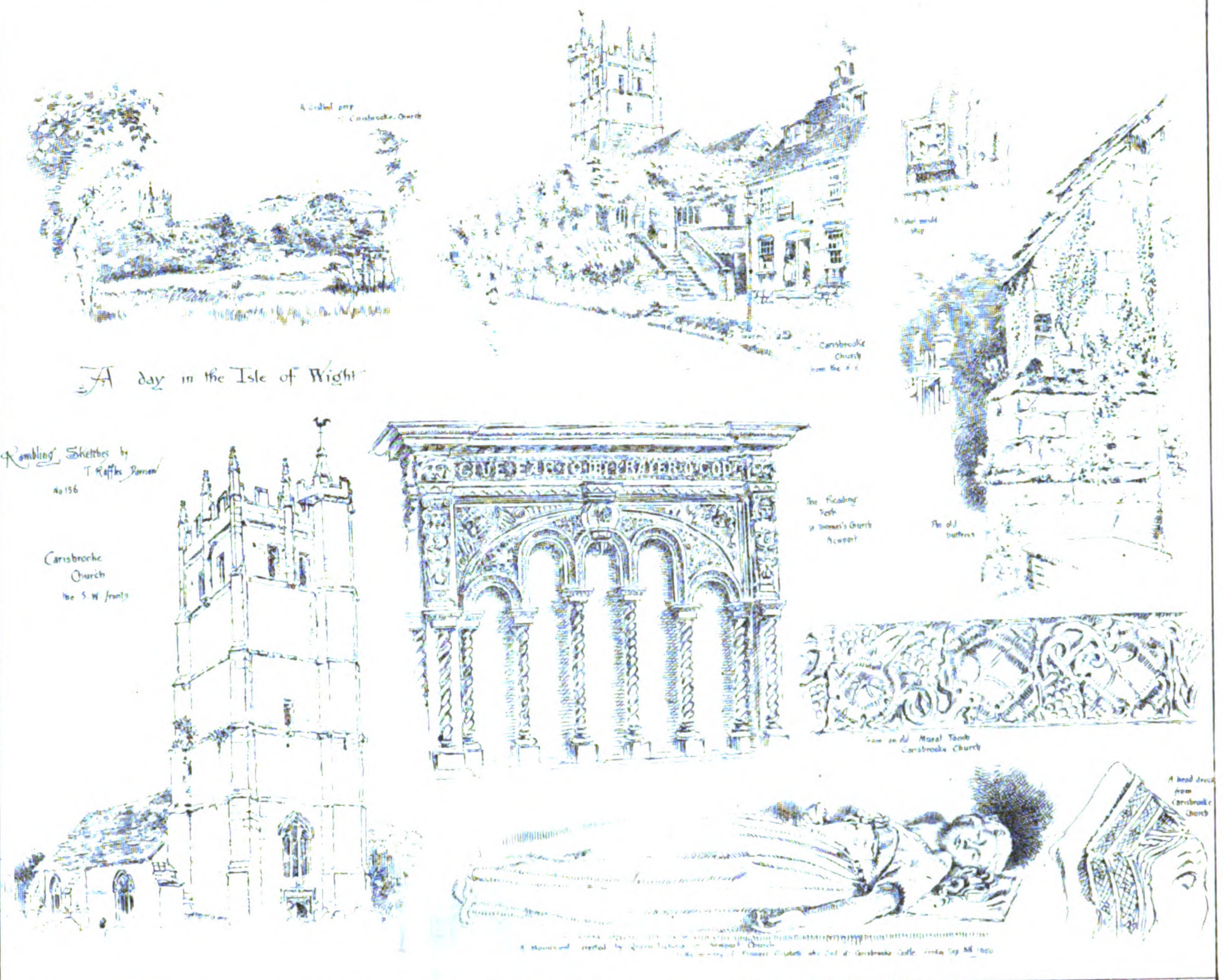

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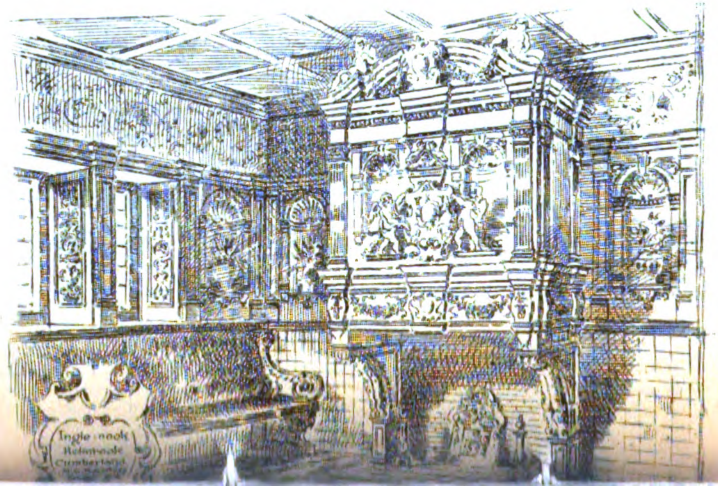
The British Architect



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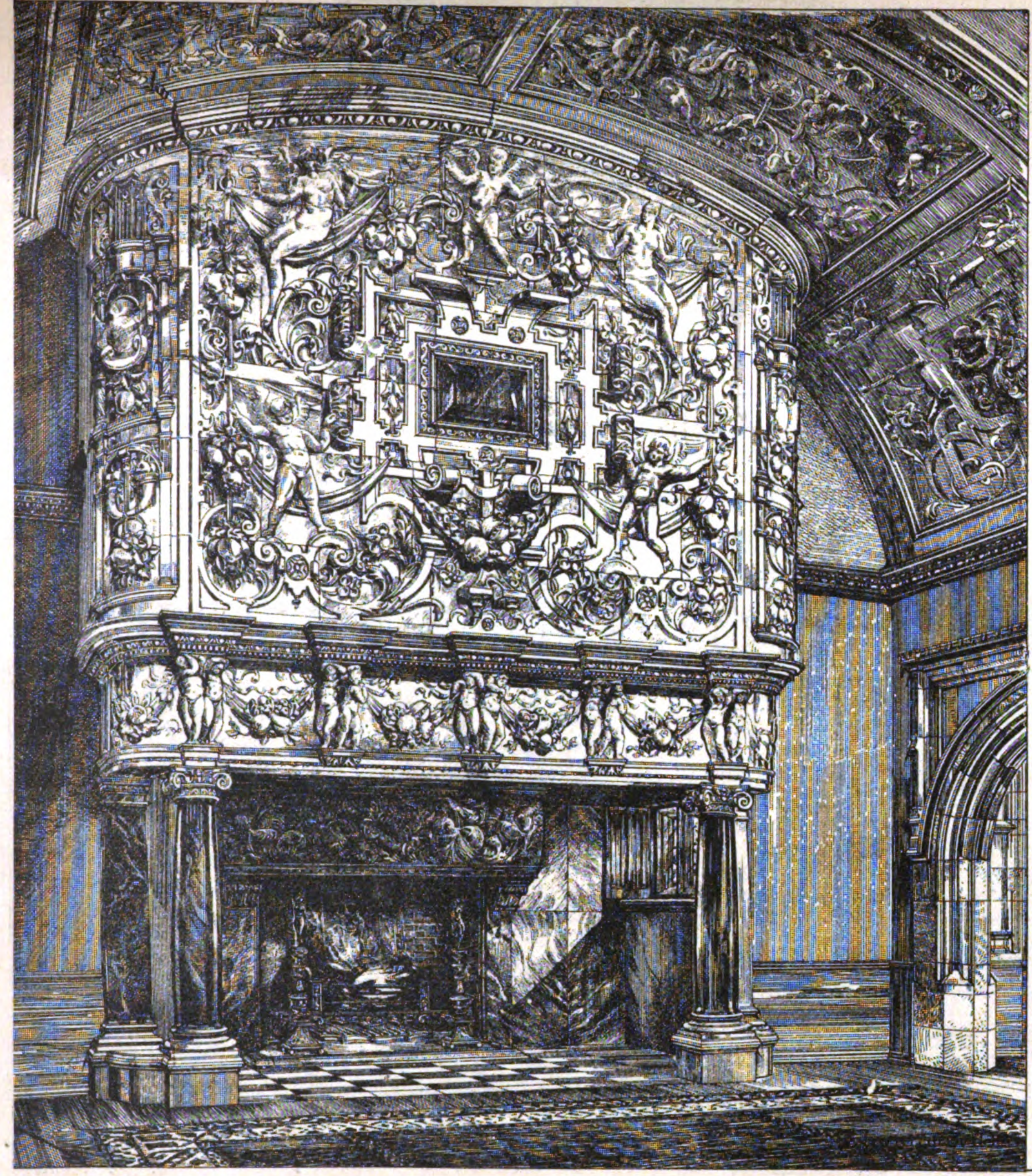

CHIMNEY-PIECE IN THE PICTURE GALLERY, CRAGSIDE.

R NORMAN SHAW. RA. ARCHITECT.

The Architect.

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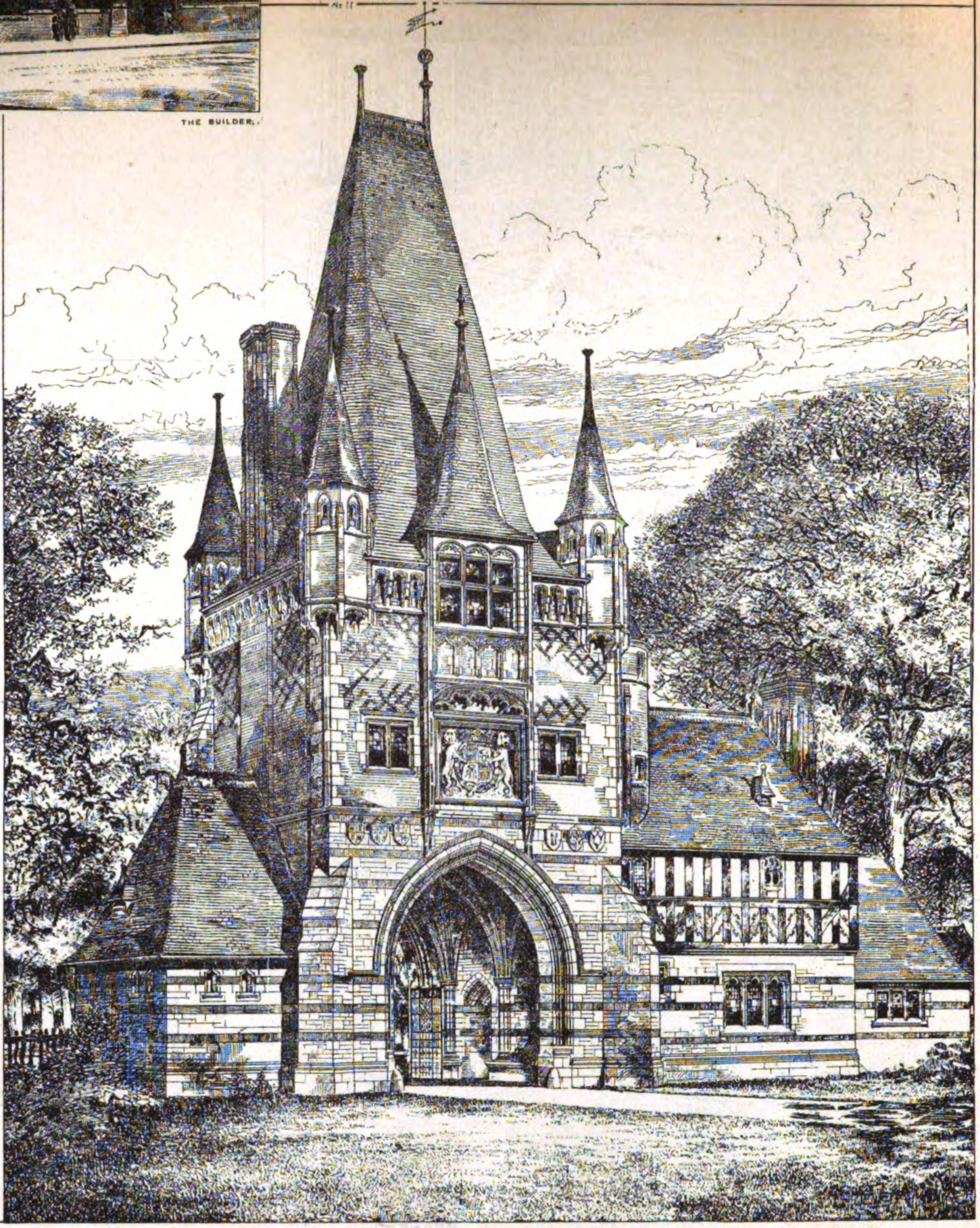
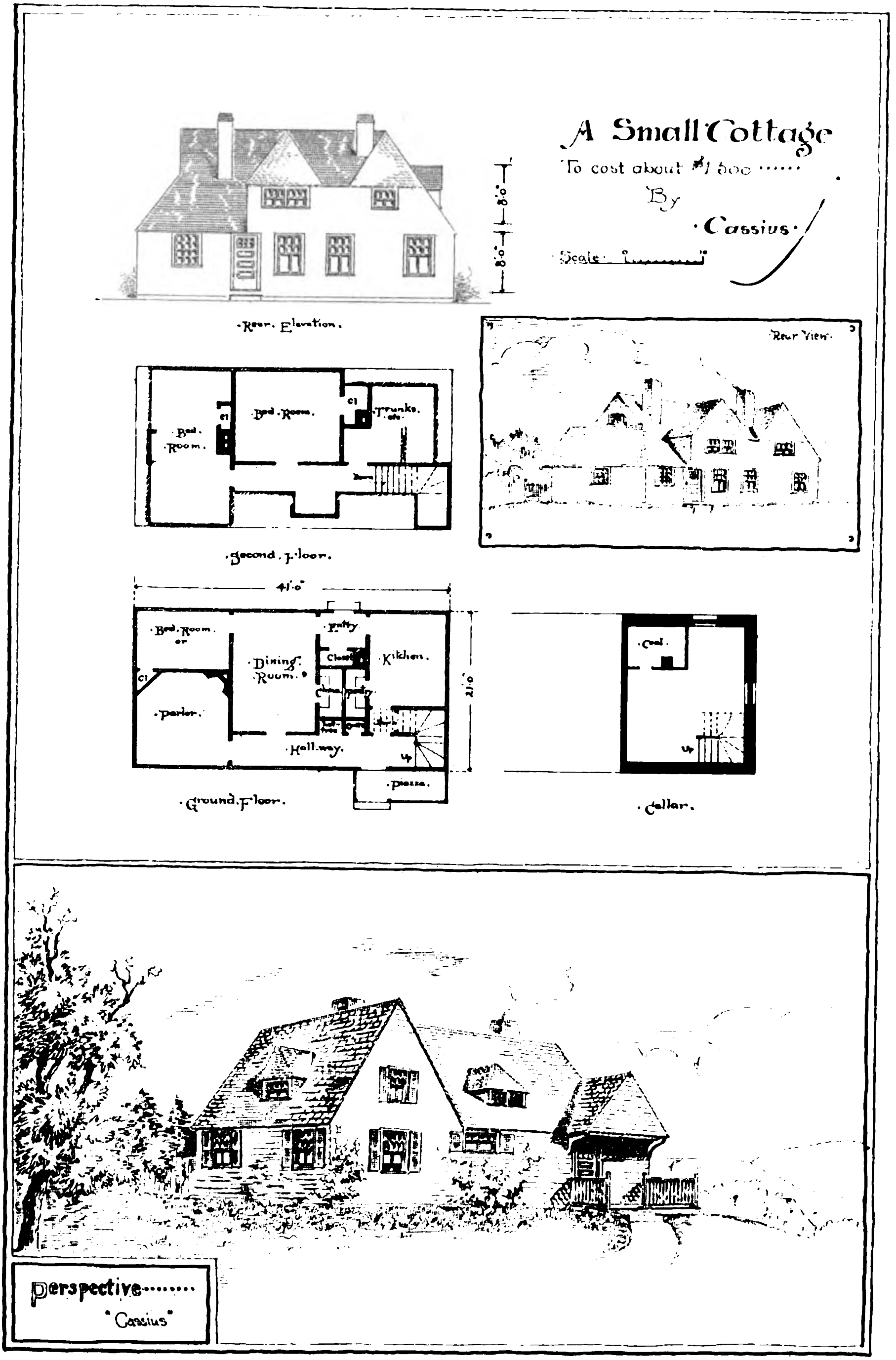
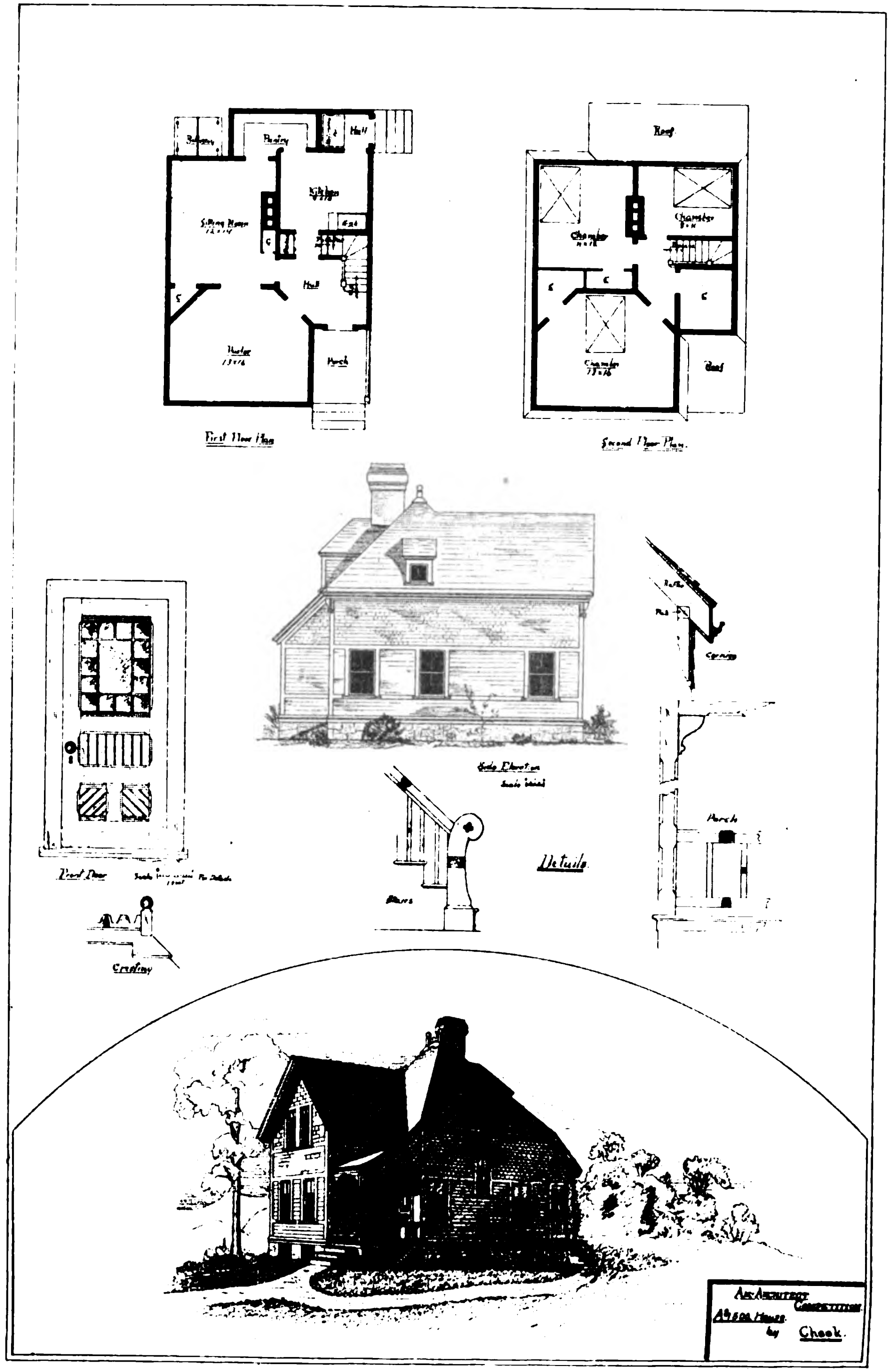


THE GATE-HOUSE ECCLESTON HALL.

JOHN DOUGLAS ARCHITECT

THE BUILDING NEWS.





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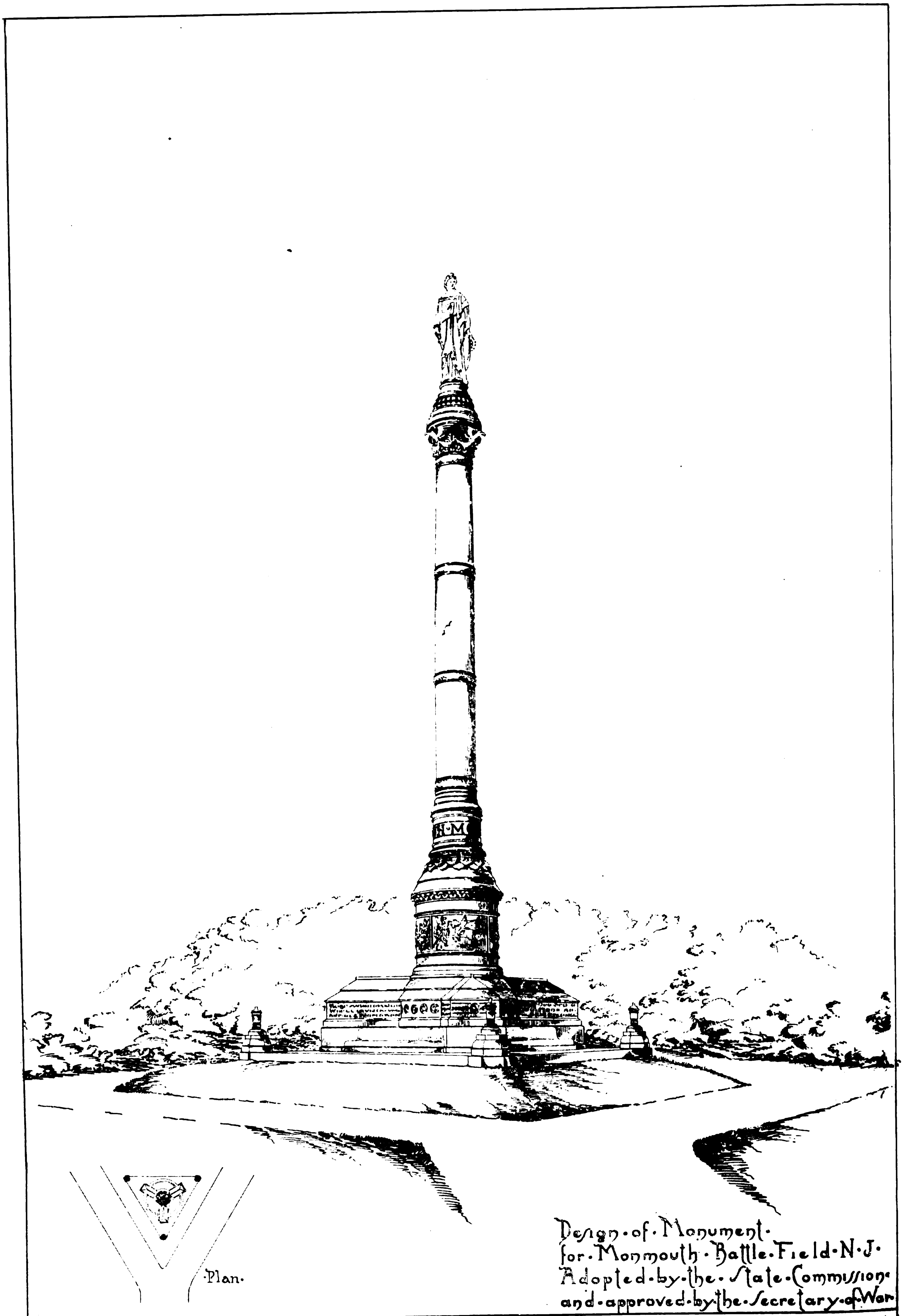

Design · of · Monument · for · Monmouth · Battle · Field · N · J · Adopted · by · the · State · Commission · and · approved · by · the · Secretary · of · War

·Emlen ·T· Littell · Architect·

·Douglas · Smyth · Architec

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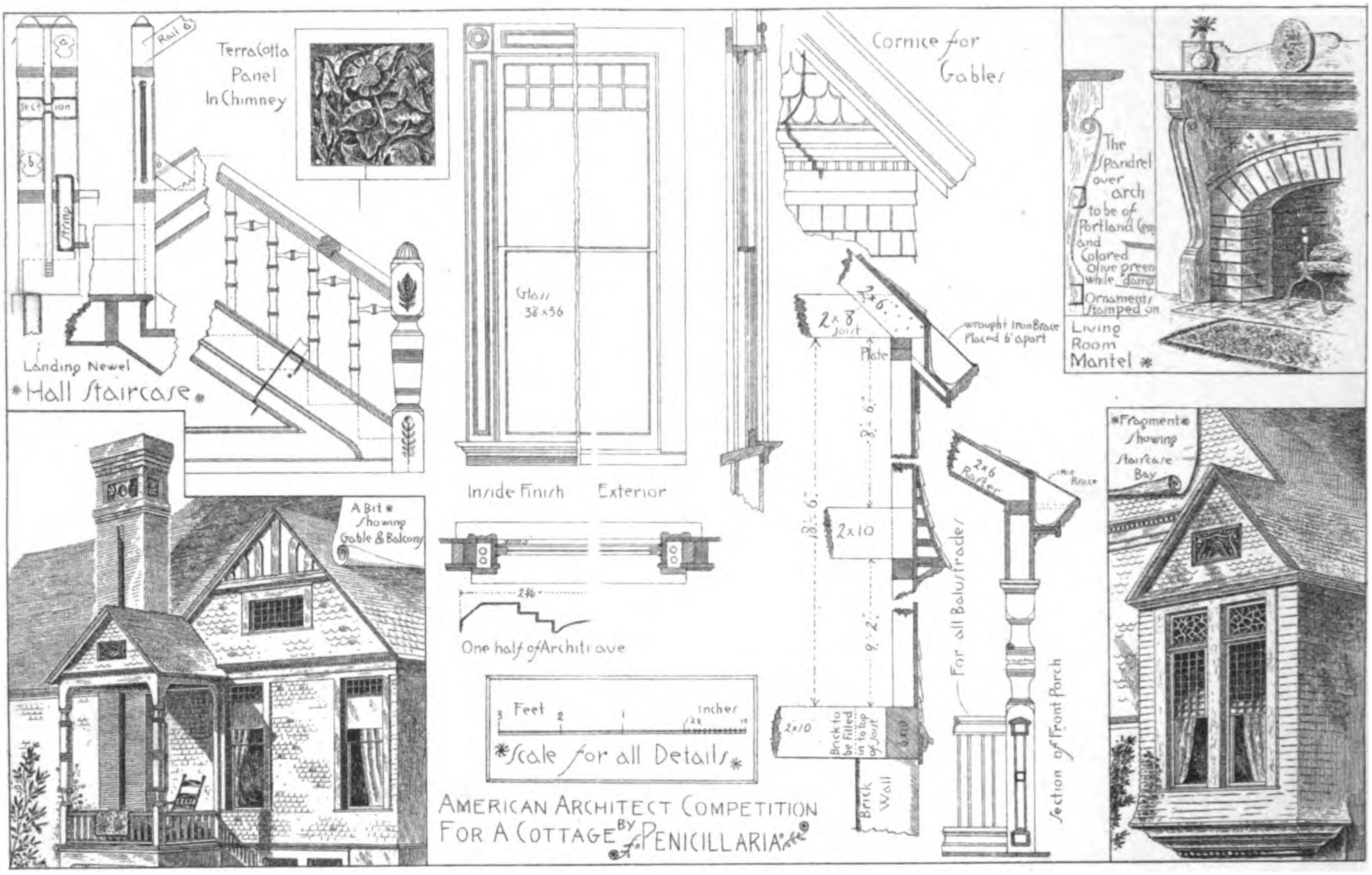
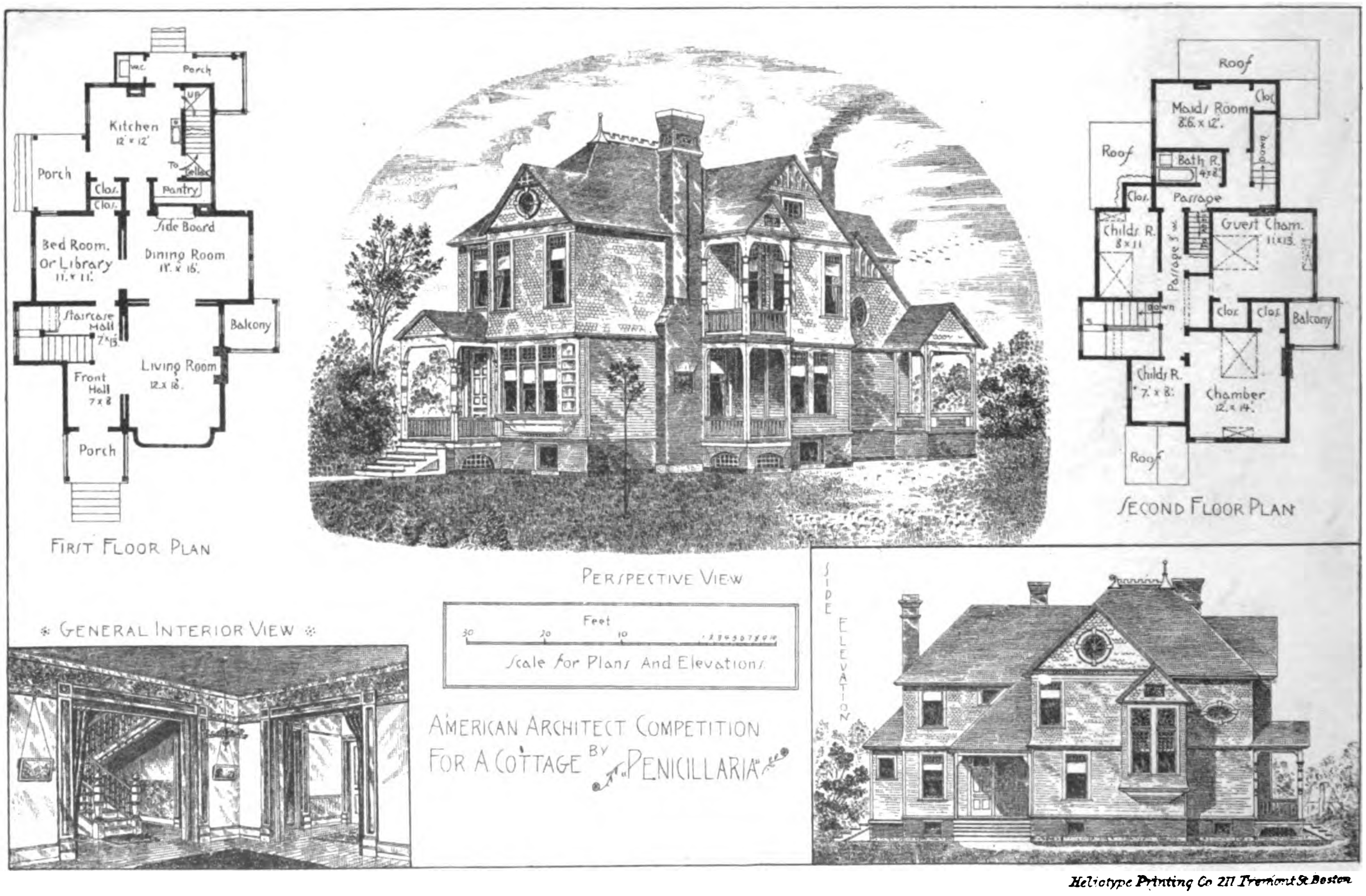
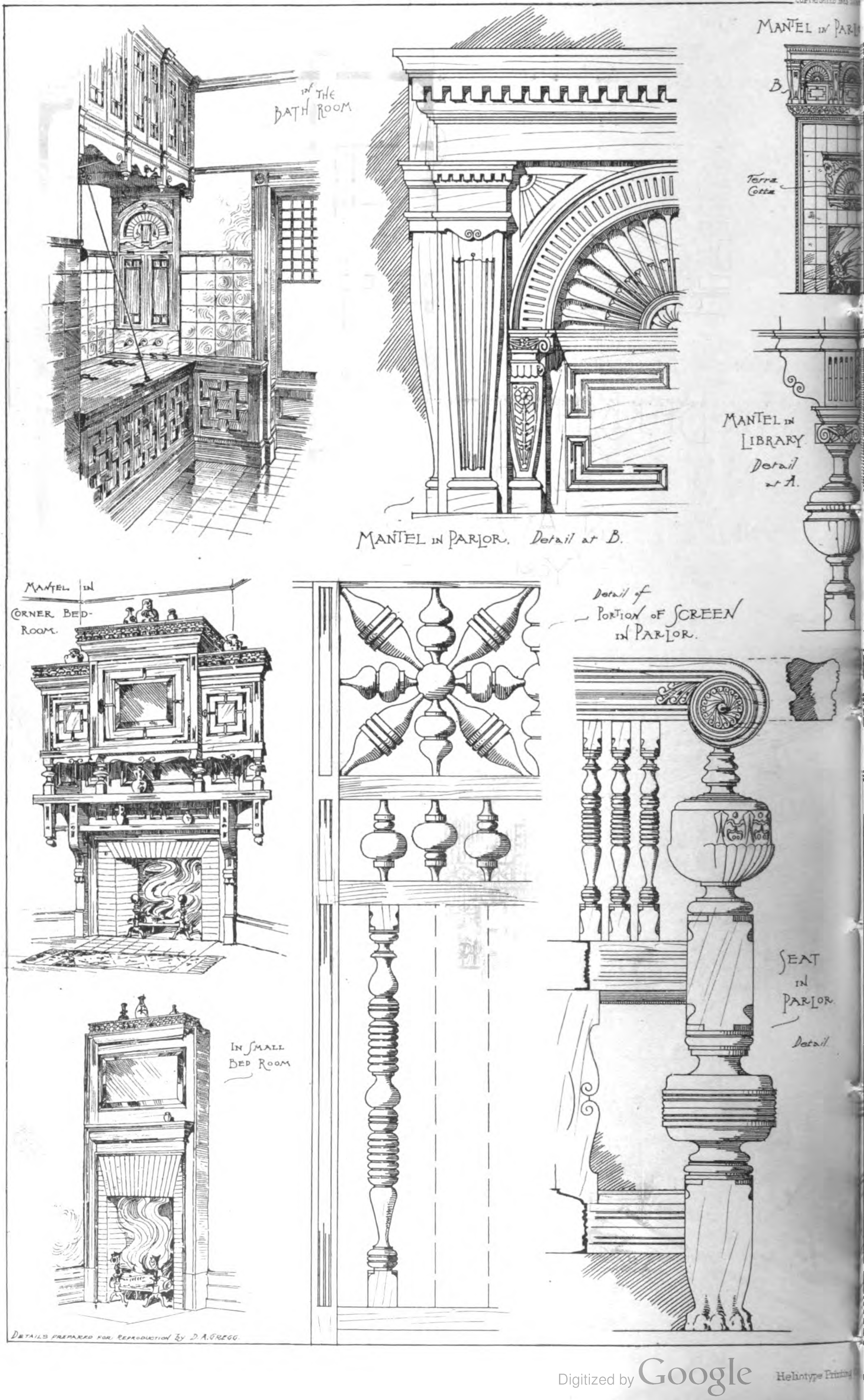




Heliotype Printing Co 211 Tremont St Boston.



DETAILS PREPARED FOR REPRODUCTION BY D. A. GREGG.

Heliotype Printing

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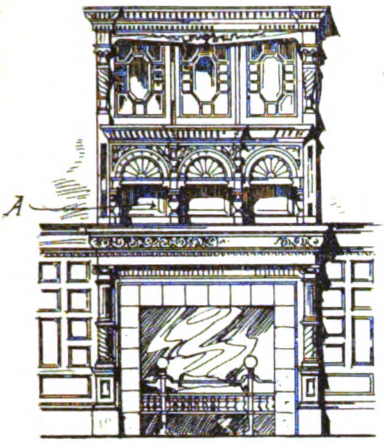
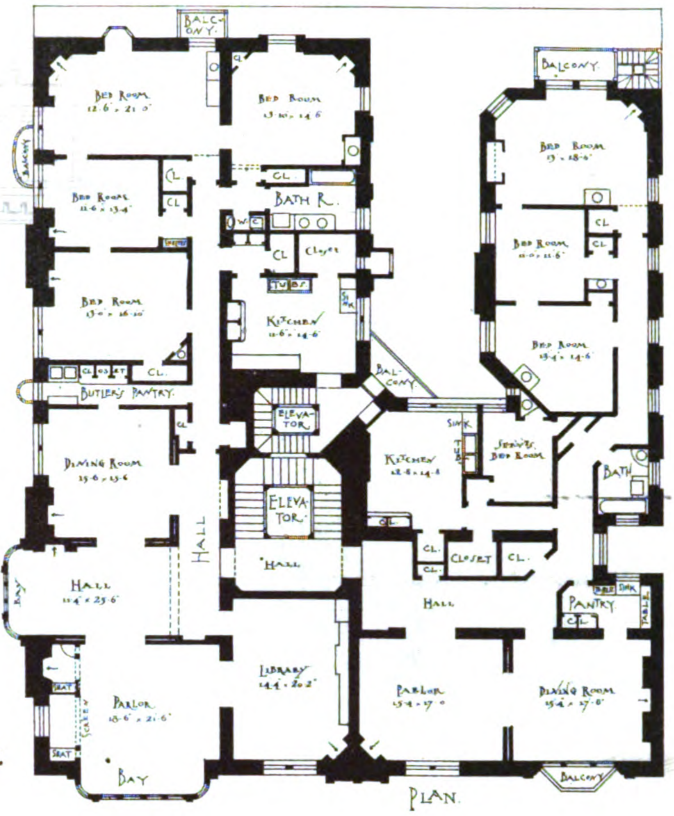


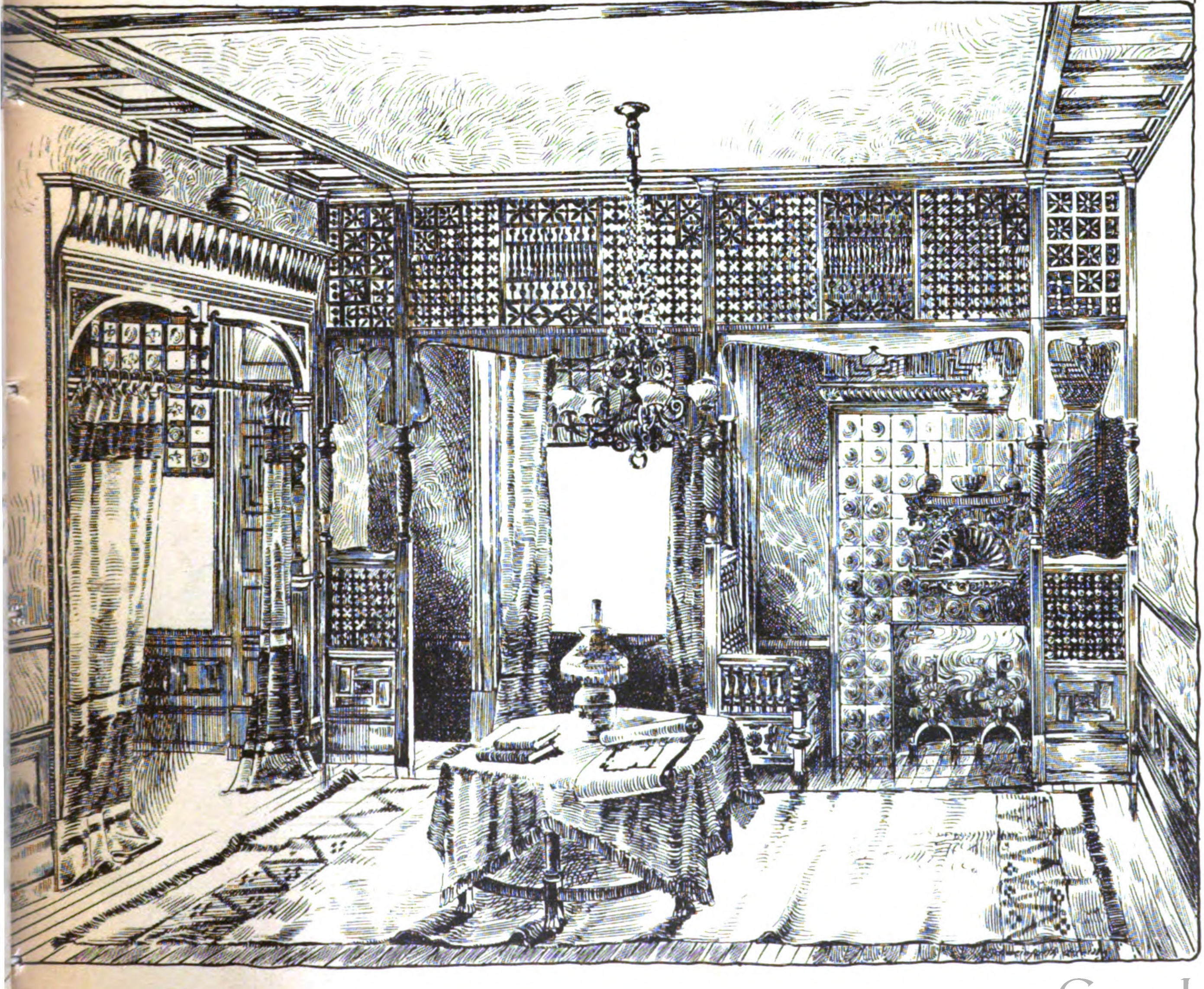


PLAN.

IN ONE OF THE CORNER APARTM'TS
OF "THE BERKSHIRE."
N·W·COR. OF 52D ST.
AND MADISON AV.
NEW YORK.

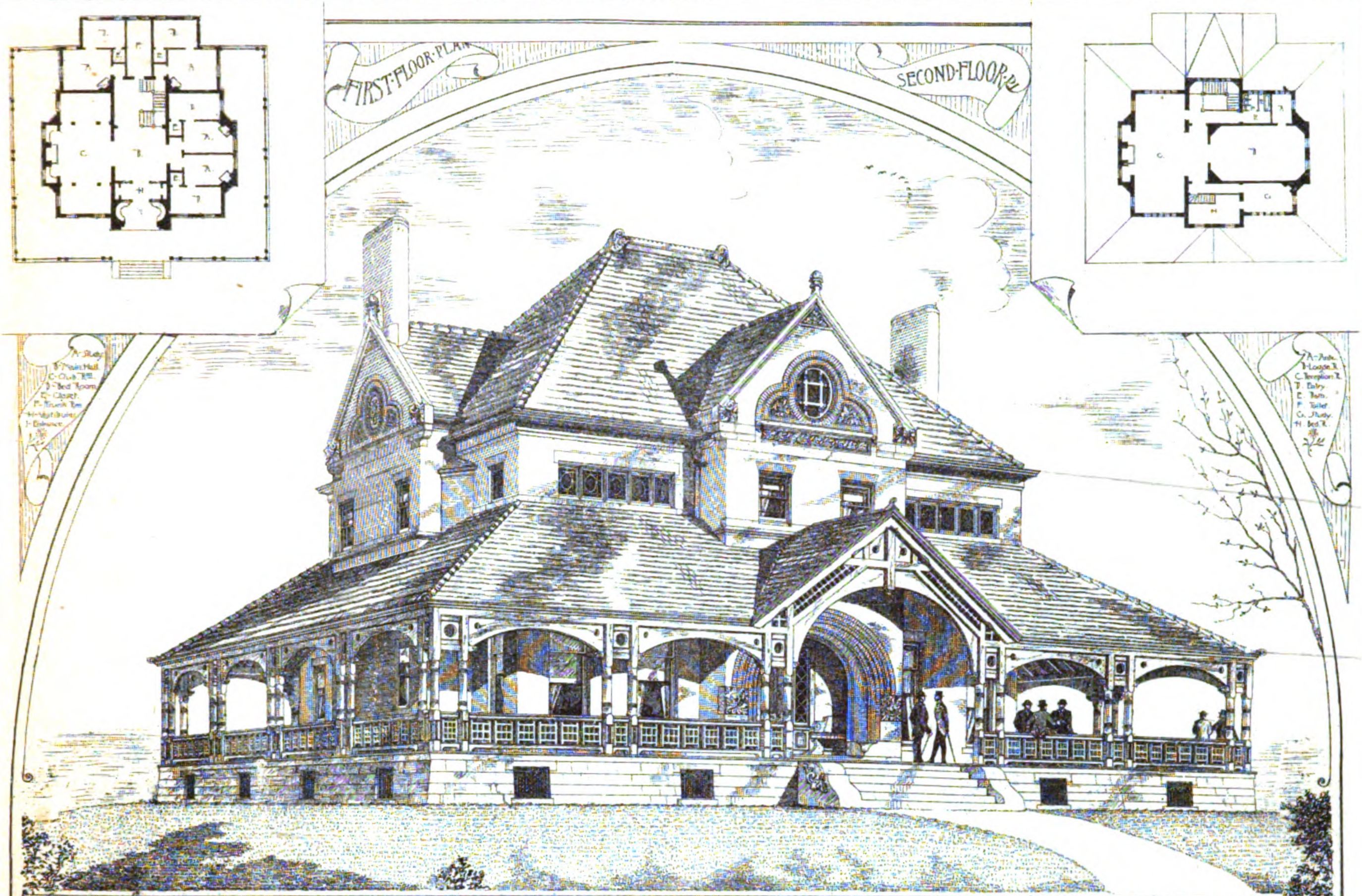
MR. CARL PFEIFFER, ARCHITECT.

THE PARLOR.

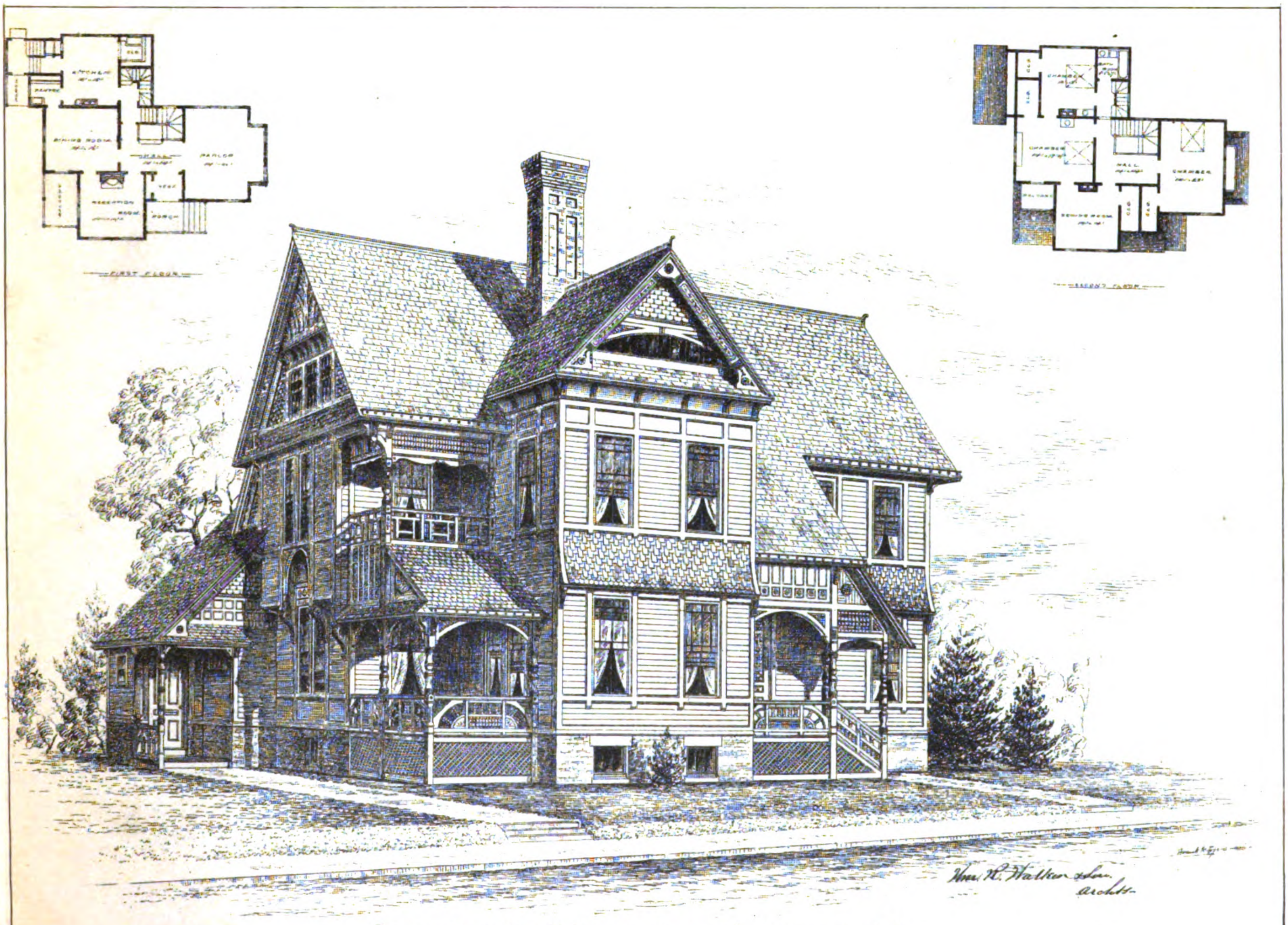


AMERICAN ARCHITECT AND BUILDING NEWS. AUG. 4, 1883. No. 397

COPYRIGHTED 1883 JAMES R. OSGOOD & Co.



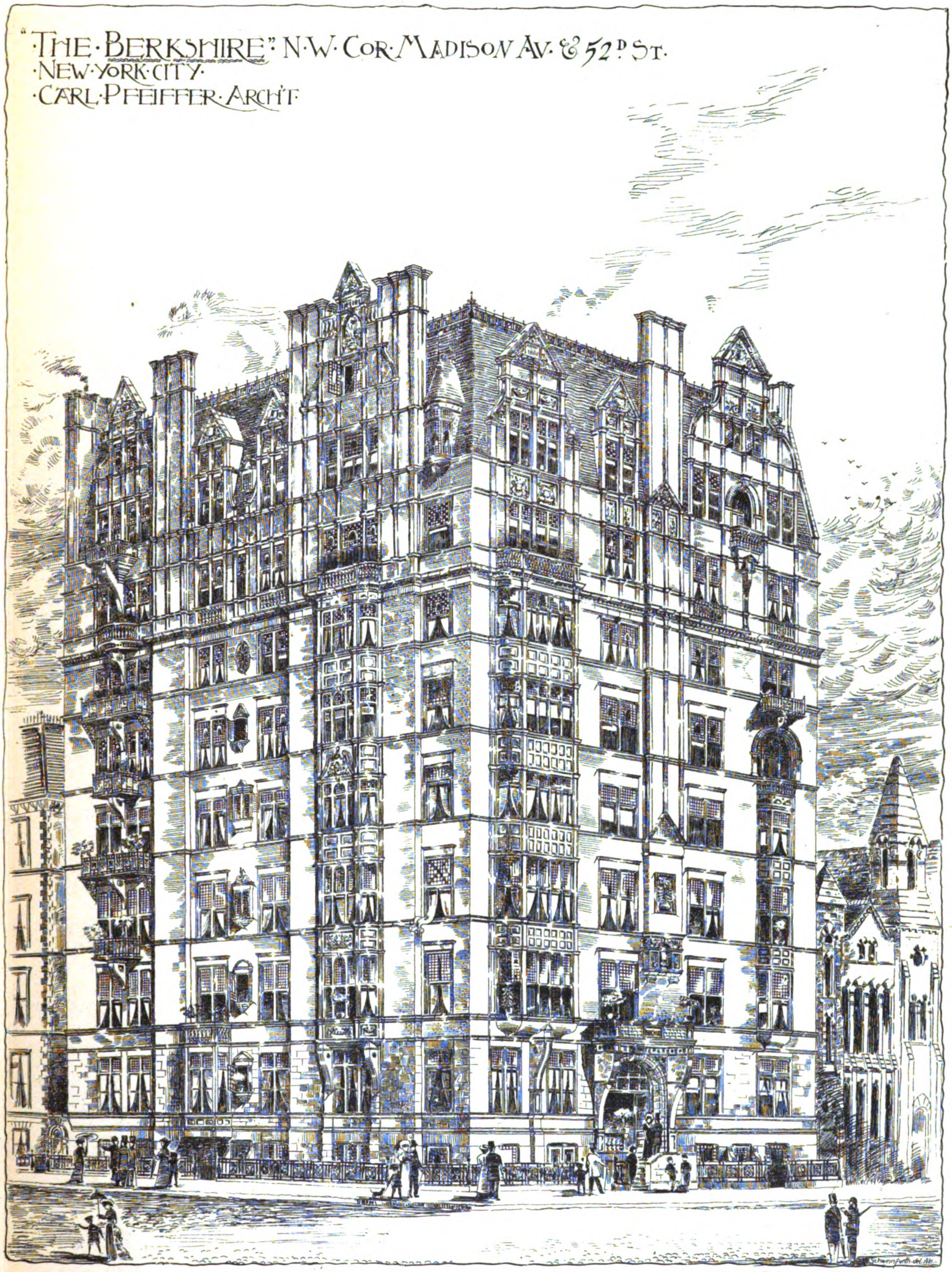
SIGMA PHI ◆ CHAPTER HOUSE ◆ WILLIAMSTOWN ◆ MASS. ◆ JAMES G. CUTLER, ARCHITECT ◆ Rochester, N.Y.



RESIDENCE OF GEO. E. BOYDEN, BAKER AVE. PROVIDENCE R. I.

Heliotype Printing Co. 211 Tremont St. Boston.

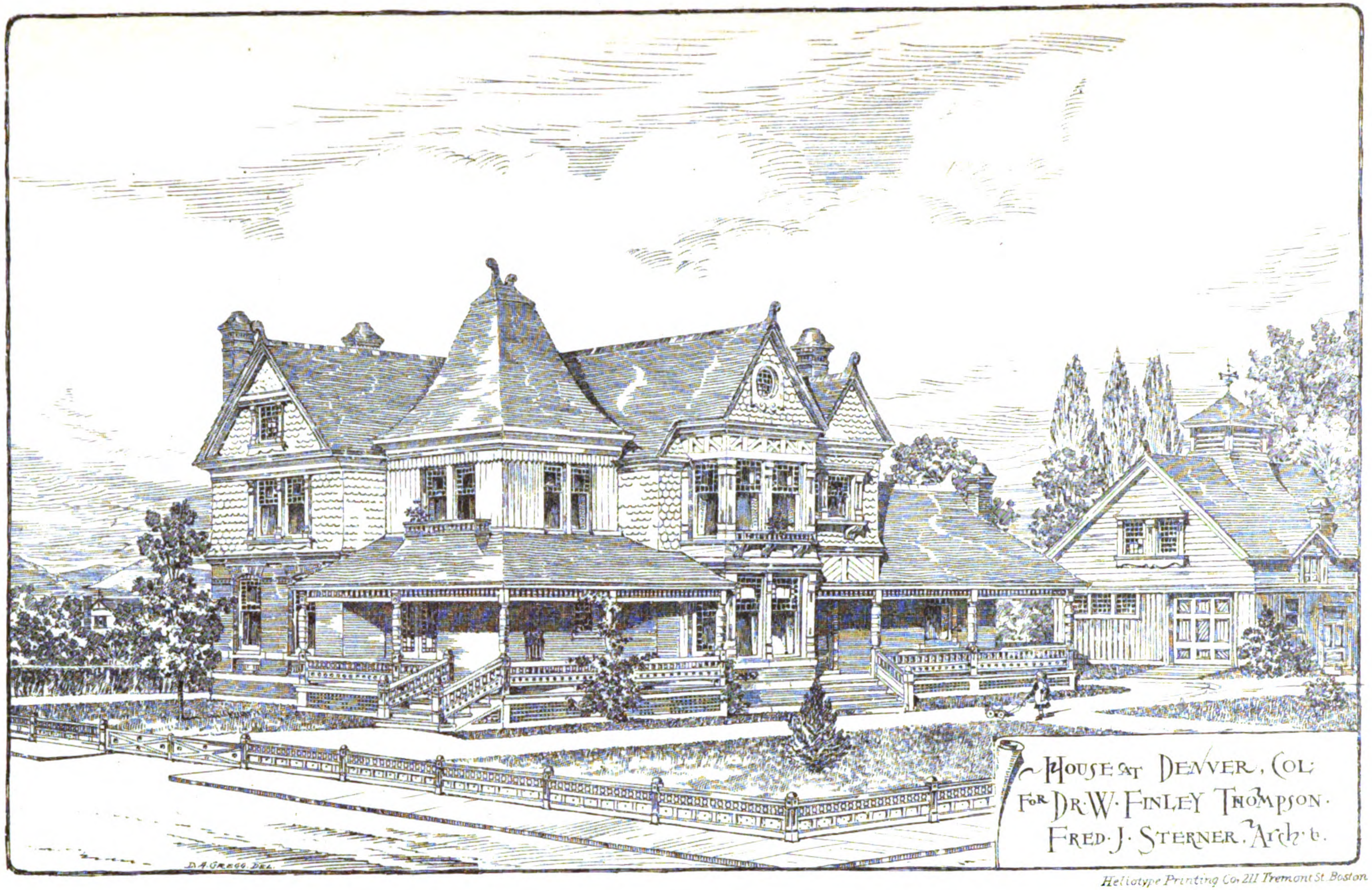
AMERICAN ARCHITECT AND BUILDING NEWS, AUG. 4, 1883. No. 397



"THE · BERKSHIRE." N · W · COR · MADISON AV. & 52D ST.
· NEW · YORK · CITY ·
· CARL · PFEIFFER · ARCH'T

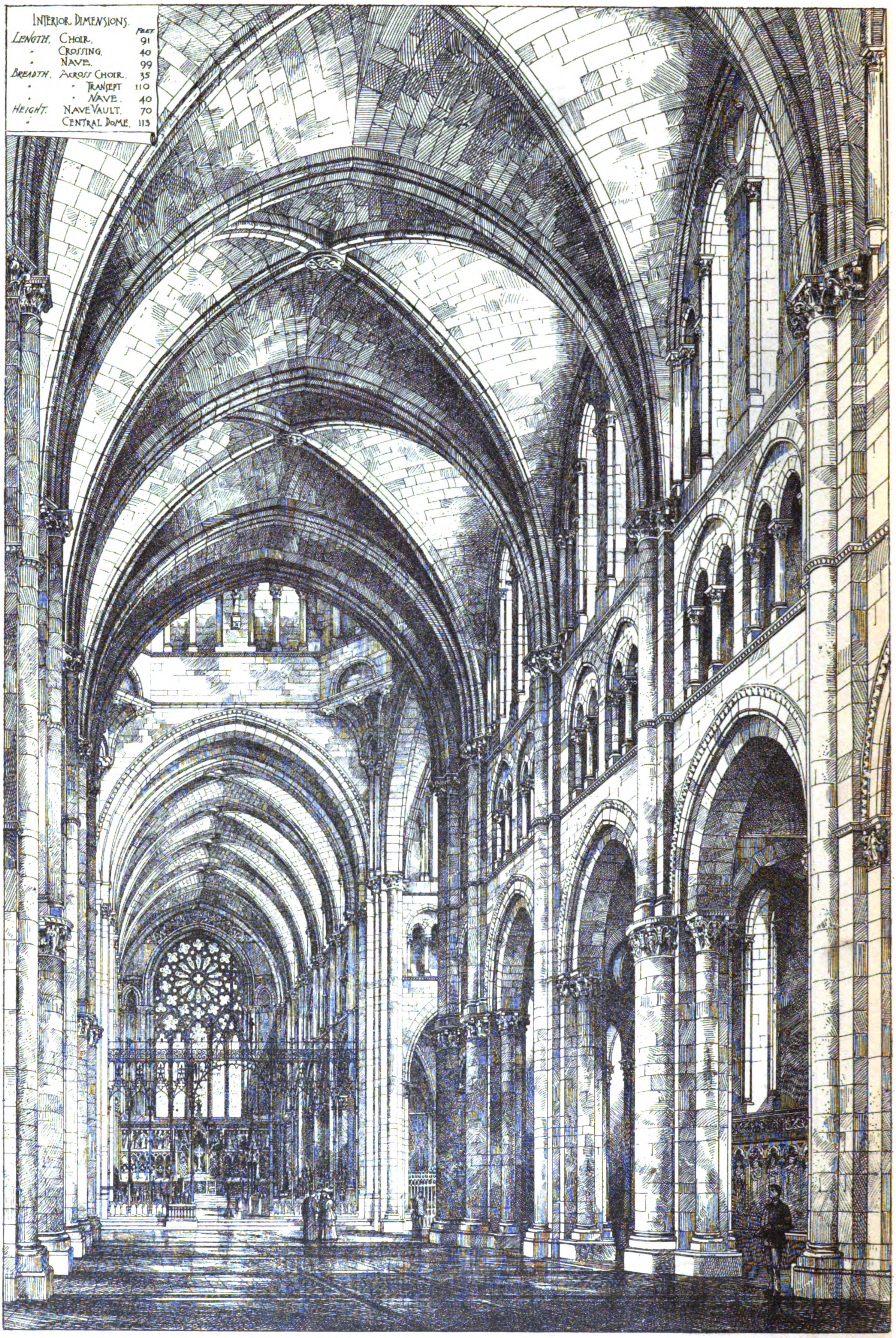
Heliotype Printing Co. 211 Tremont St, Boston.

aug. 11.



House at Denver, Col:
For Dr. W. Finley Thompson.
Fred. J. Sterner, Arch't.

Heliotype Printing Co. 211 Tremont St. Boston



INTERIOR DIMENSIONS.

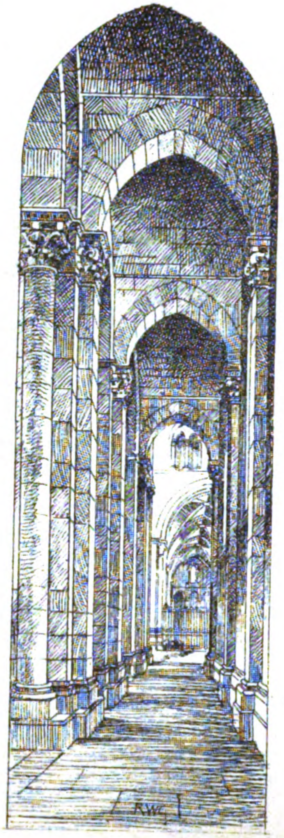
		FEET
LENGTH.	CHOIR.	91
"	CROSSING.	40
"	NAVE.	99
BREADTH.	ACROSS CHOIR.	35
"	" TRANSEPT	110
"	" NAVE.	40
HEIGHT.	NAVE VAULT.	70
"	CENTRAL DOME.	113

Heliotype Printing Co. 211 Tremont St. Boston

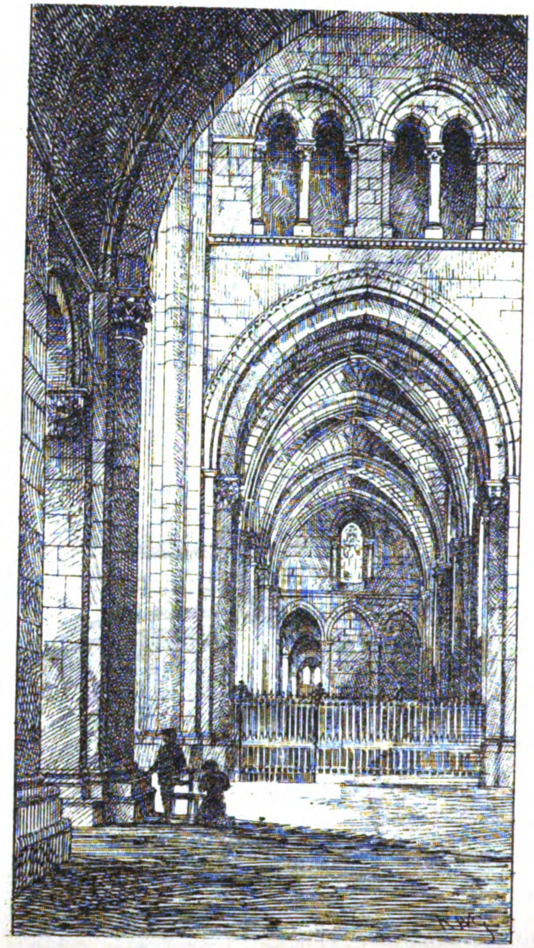
New Cathedral of All Saints, ALBANY N.Y. *Interior looking East.*

ROBERT W. GIBSON Architect, ALBANY.

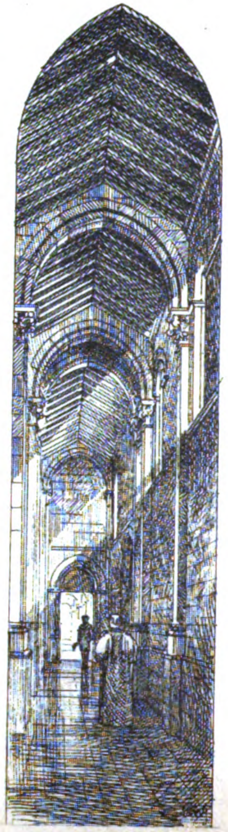
NEW CATHEDRAL OF ALL SAINTS, ALBANY, N.Y. *NORTH SIDE OF CHOIR FROM S. TRANSEPT.*



SOUTH AISLE.



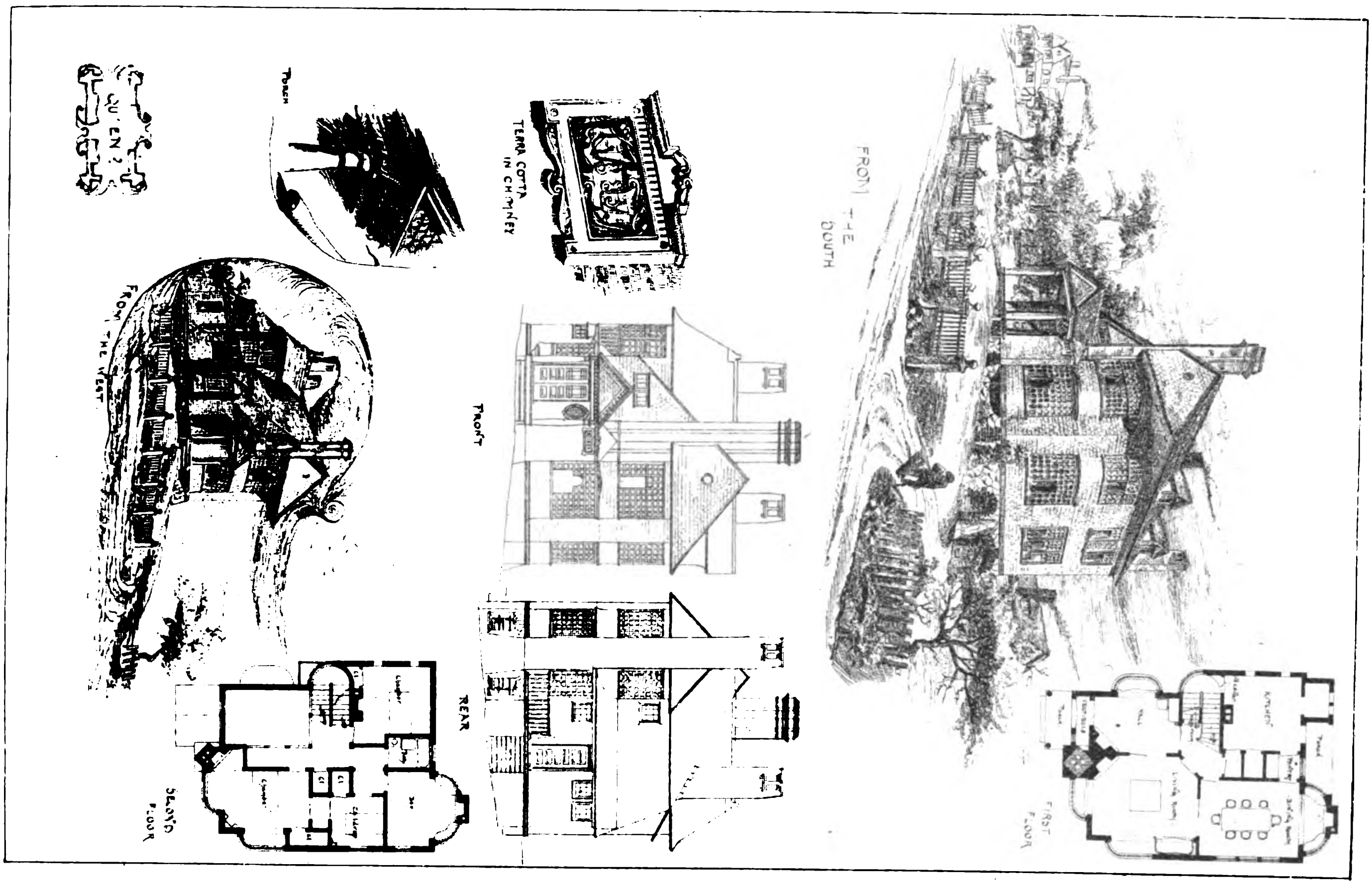
SOUTH CHOIR AISLE.

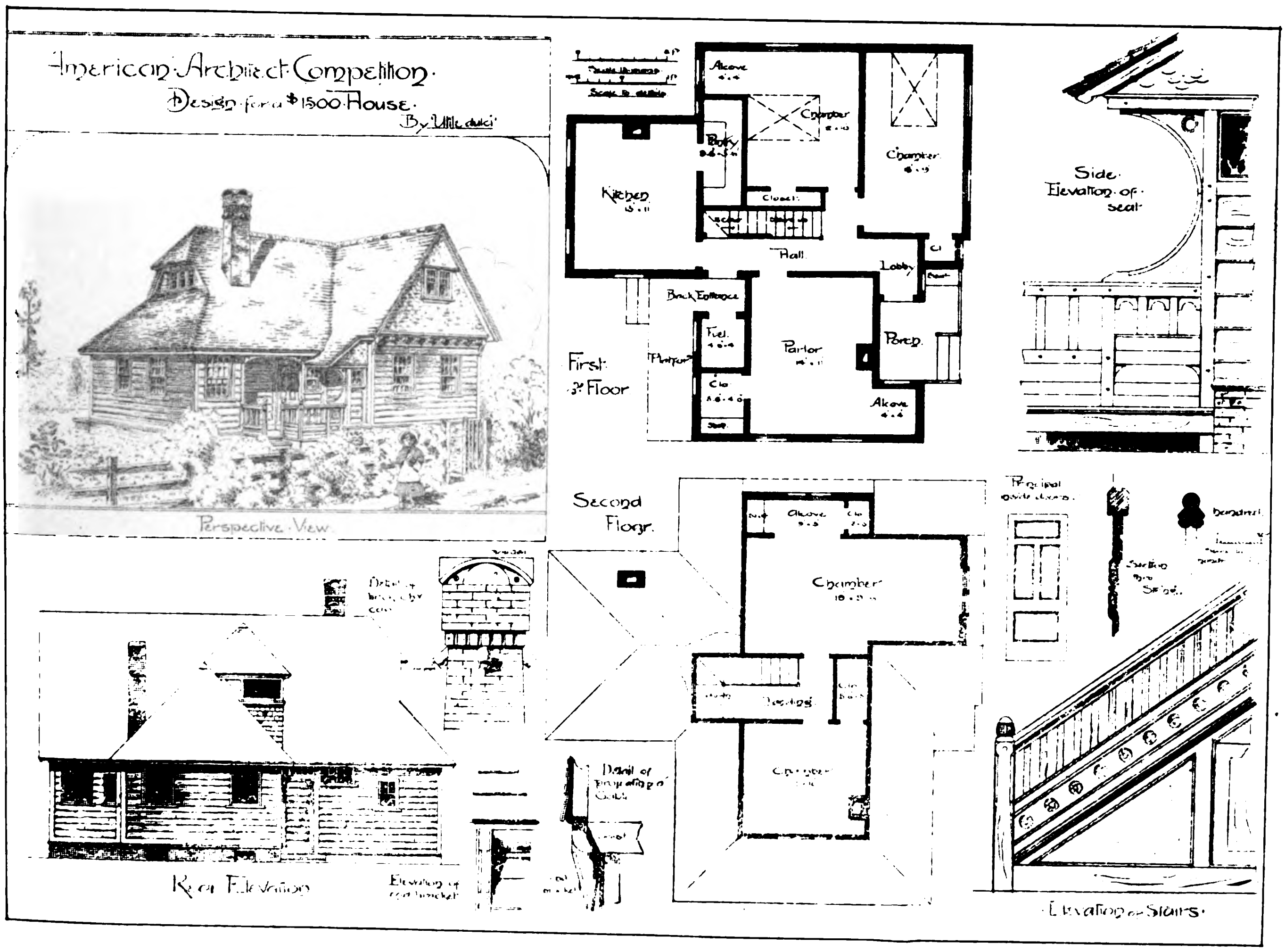


AMBULATORY.

ROBERT W. GIBSON, ARCH'T ALBANY.

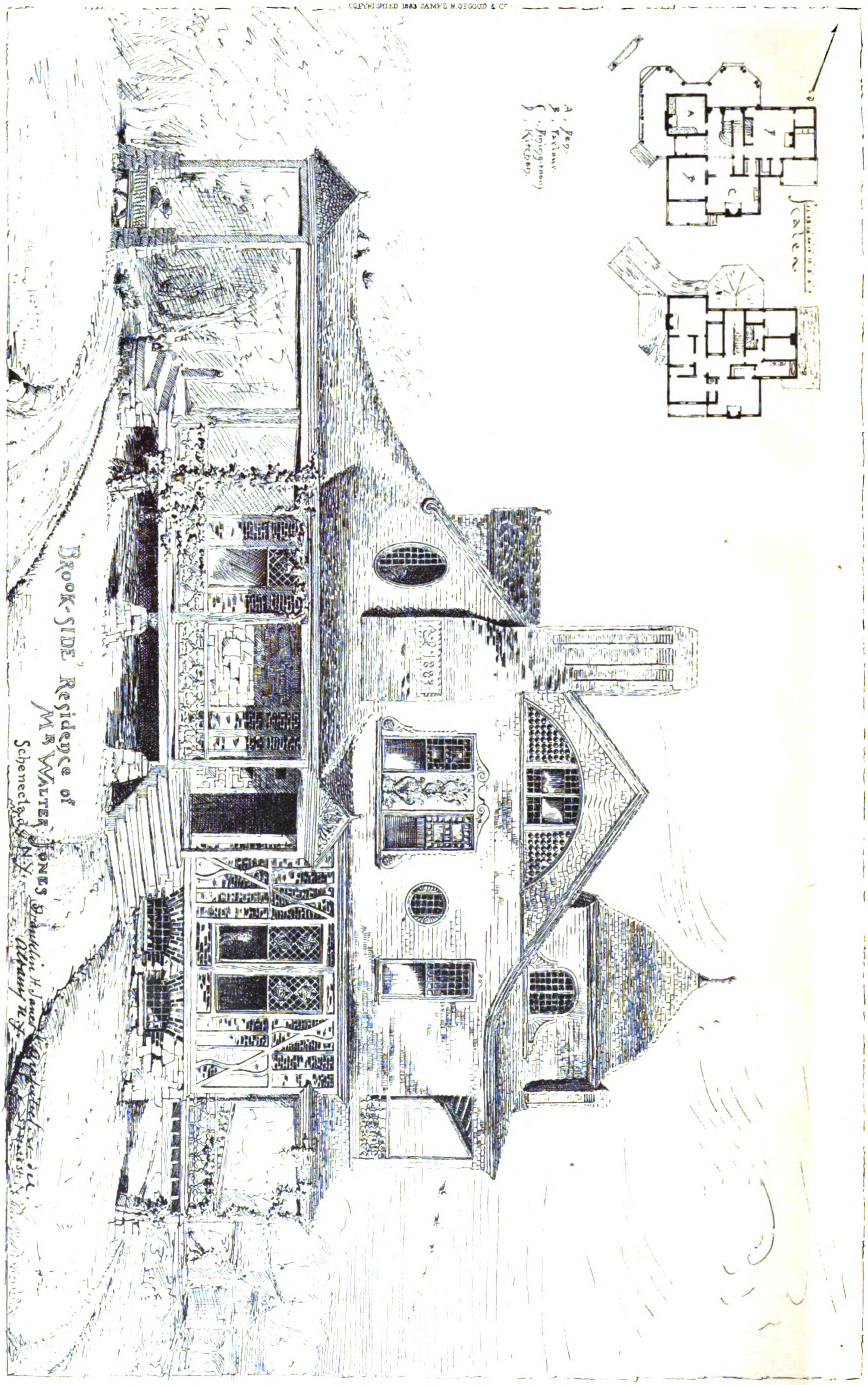
Heliotype Printing Co. 211 Tremont St. Boston





Heliotype Printing Co. 211 Tremont St. Boston

aug. 1 8



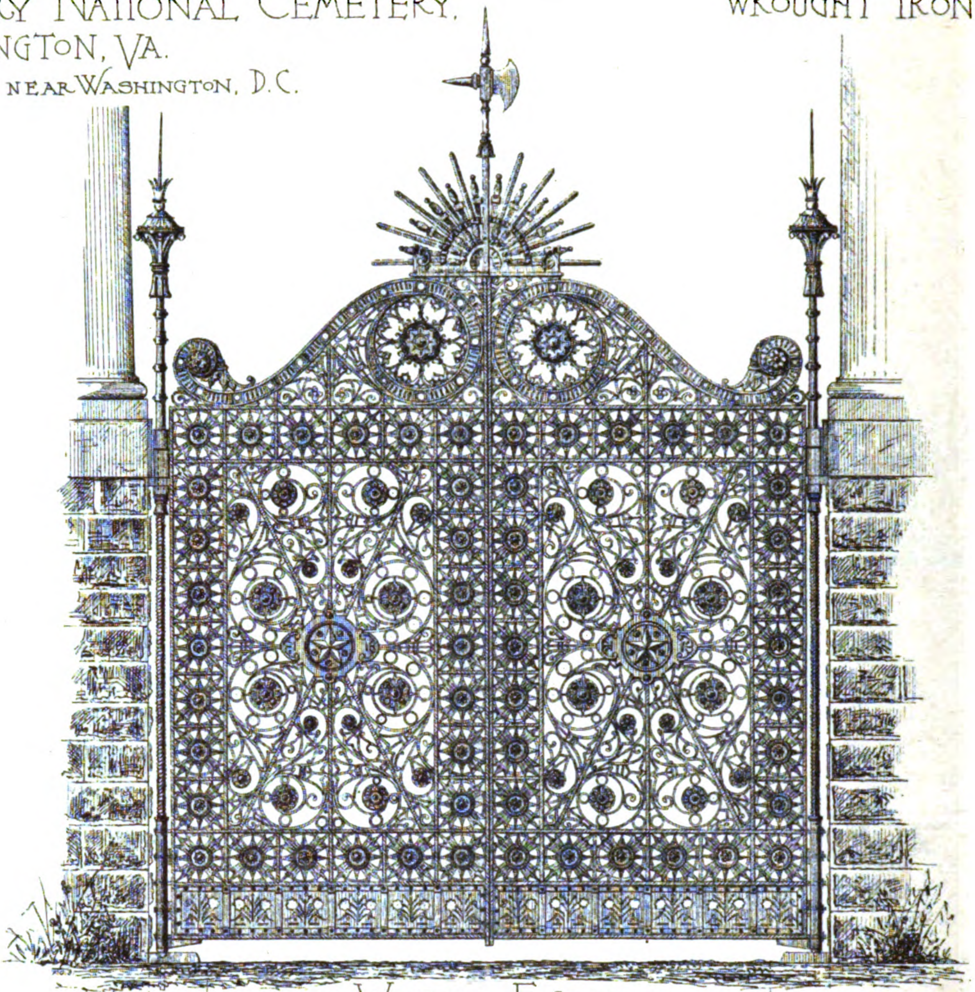
"Brook-Side" Residence of Mr Walter Jones Schenectady N.Y.

Franklin H. Janes Architect, [illegible] State St. Albany N.Y.

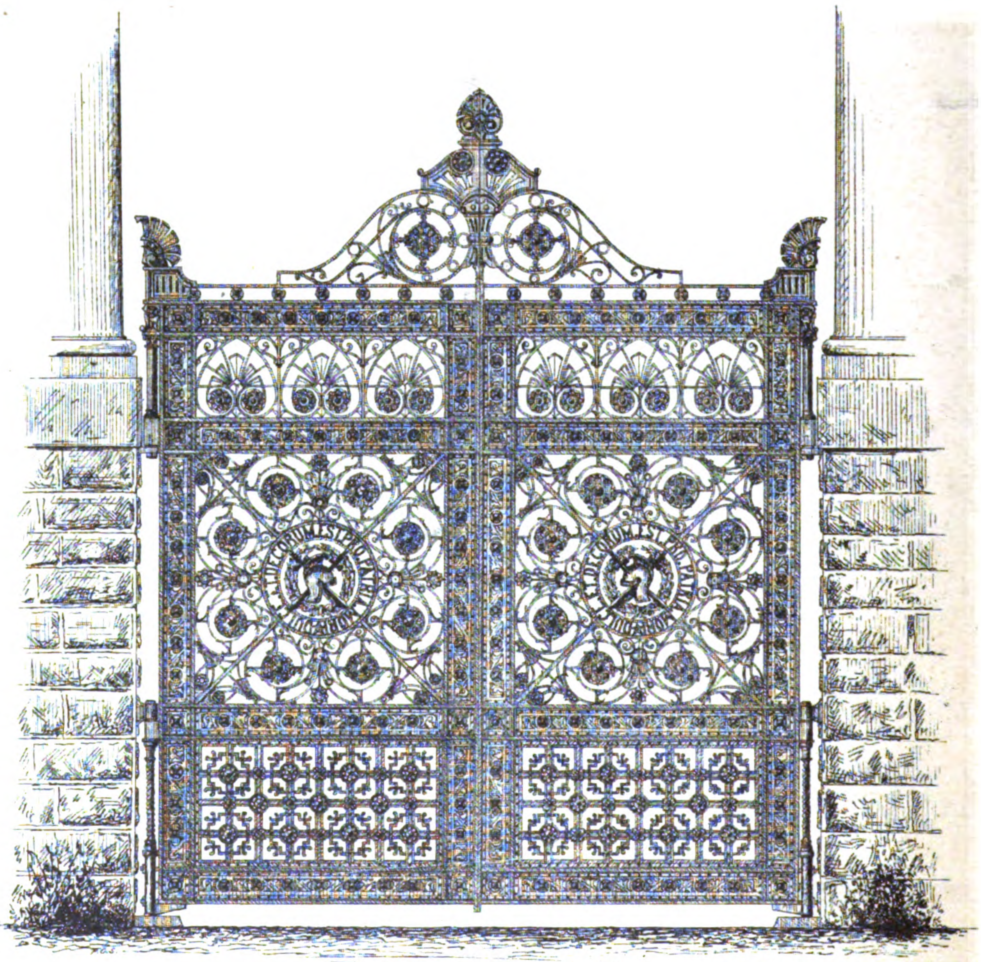
Heliotype Printing Co. 211 Tremont St. Boston.

Military National Cemetery
at Arlington, Va.
near Washington, D.C.

Wrought Iron Gates.



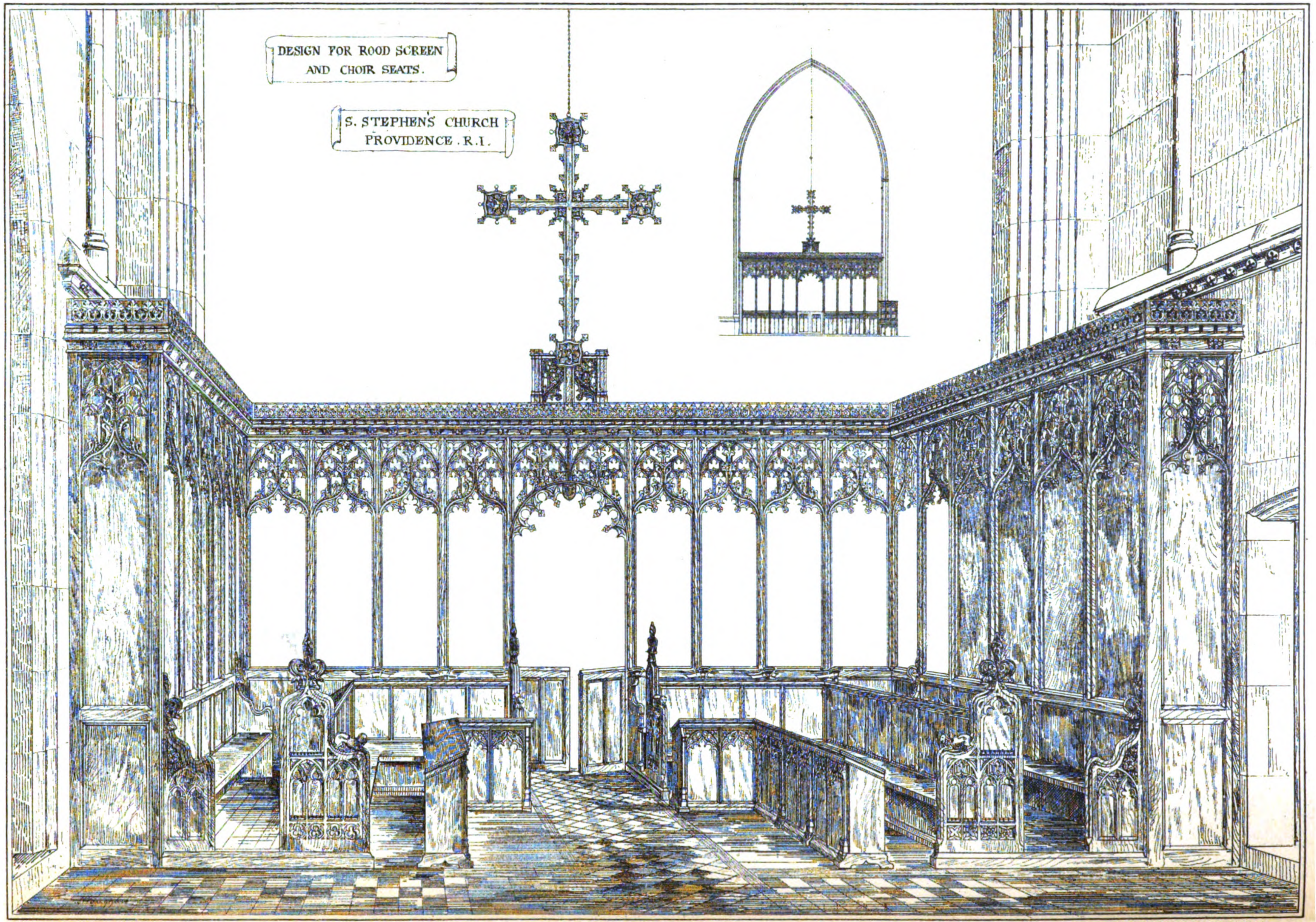
at Western Entrance



at Eastern Entrance.

Smithmeyer & Pelz, Architects.
Washington D.C.

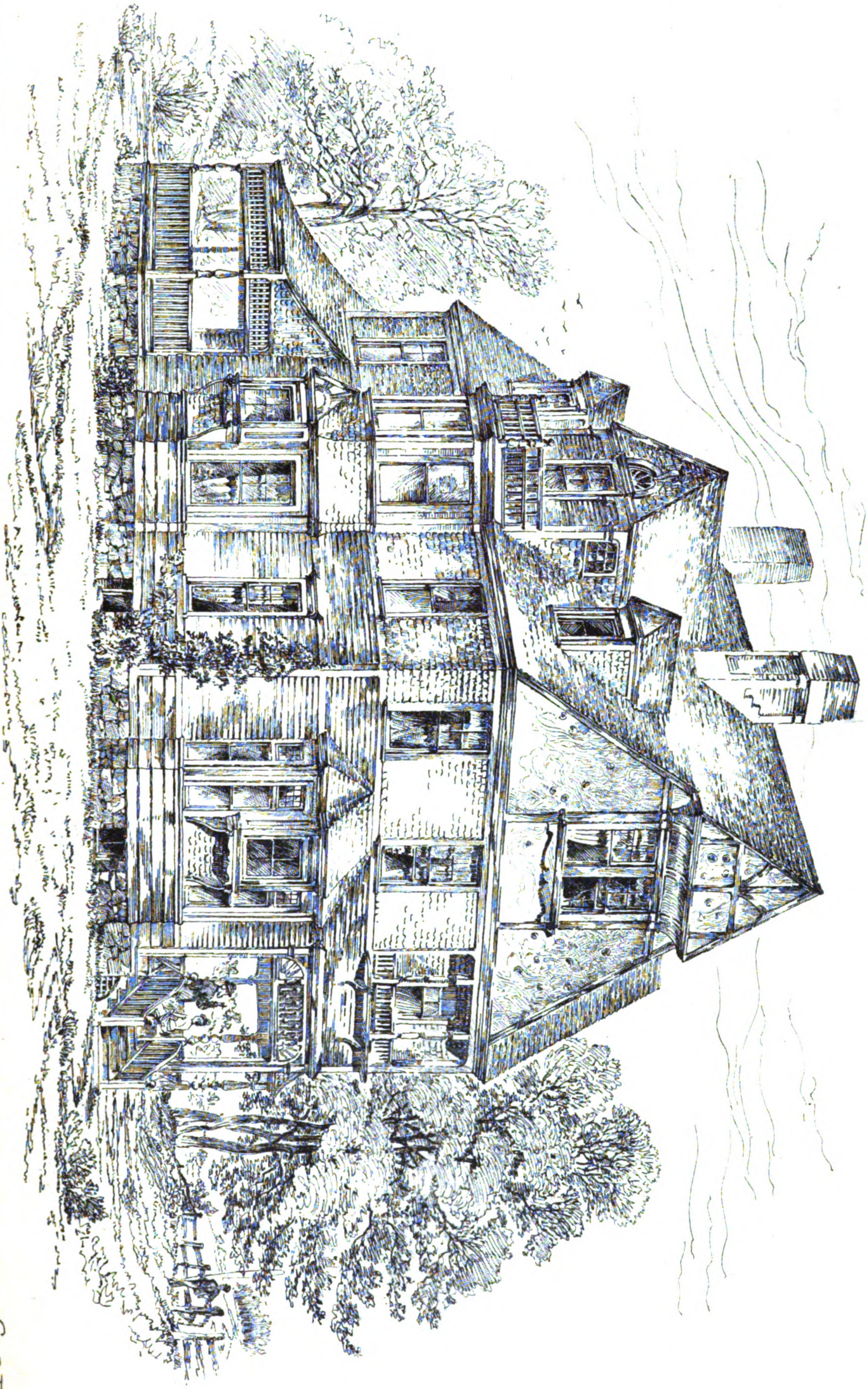
Heliotype Printing Co. 211 Tremont St. Boston.



Heliotype Printing Co. 211 Tremont St. Boston

VIEW LOOKING FROM THE ALTAR.

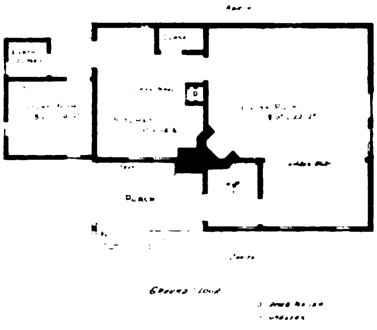
HENRY VAUGHAN. ARCHITECT.
10. PEMBERTON SQUARE. BOSTON.

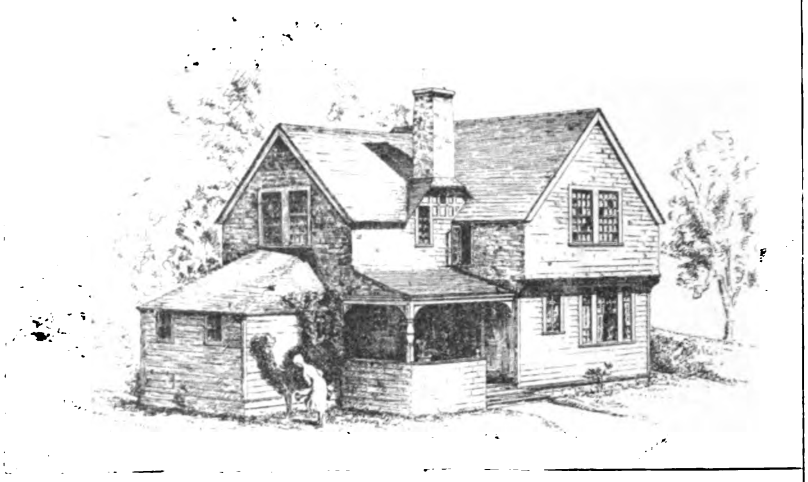


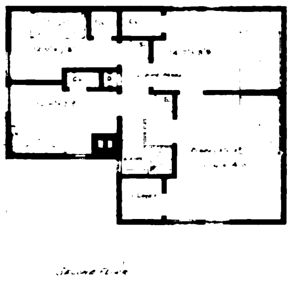
HOUSE ON WAYNE ST. DORCHESTER DISTRICT... GEO. MOFFETTE. ARCHT. BOSTON. MASS.

Heliotype Printing Co. 211 Tremont St. Boston.

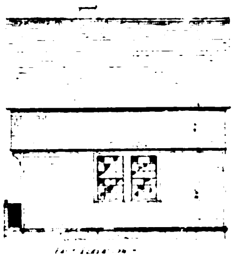
No. 400 American Architect and Building News. Aug. 25. 1883.







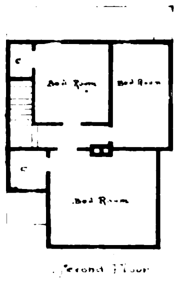
For Plans and Elevations



AMERICAN ARCHITECT COMPETITION

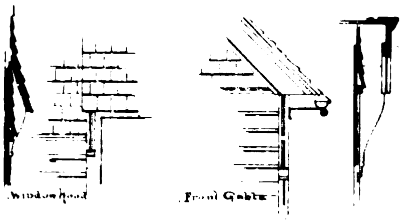
HOUSE FOR MECHANICS

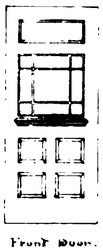
DESIGN BY "VULCAN."

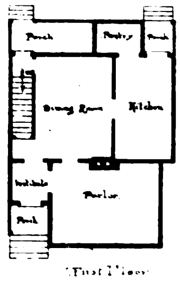


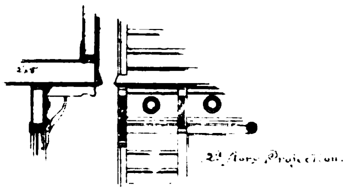
Scale of Details

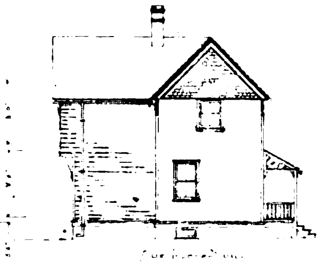
Scale of Plans

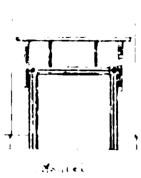




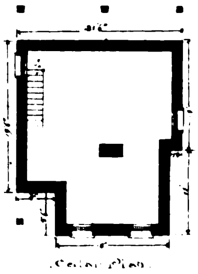








American Architect Competition for a $1500 House by "EUCHRE."



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The Gilded Virgin of Amiens.
The Archer from the Temple of Ægina.

Renaissance Corbel.

Doorway from the Cathedral of Vezelay.
Tomb of Francis II. and of Margaret de Foix.

Fragment of the Cathedral of Arles.
Minerva, from the Temple of Ægina.

THE BUILDER.

THE MUSEUM OF COMPARATIVE SCULPTURE, IN THE PALACE OF THE TROCADÉRO, PARIS.

The British Architect.

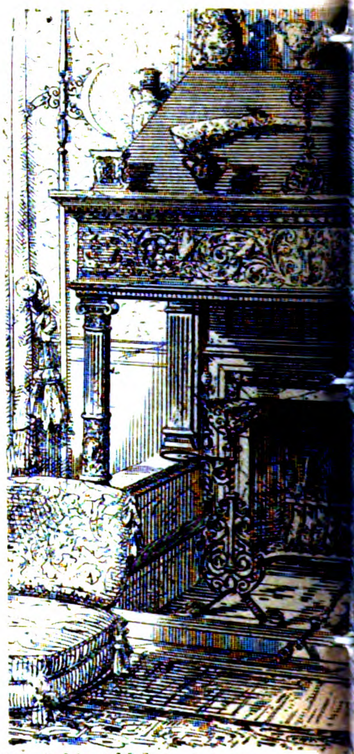
AMERICAN ARCHITECT AND

INAUGURATION DE LA STATU

PLACE DE LA RÉPUBLIQUE

PIÉDESTAL : Architecte, M. Morice. — MATS

LA SEMAINE DES CONSTRUCTEURS.

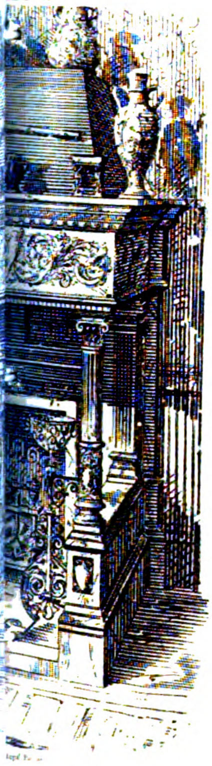


The Cabinet Maker.

OUR FOREIGN

E LA RÉPUBLIQUE

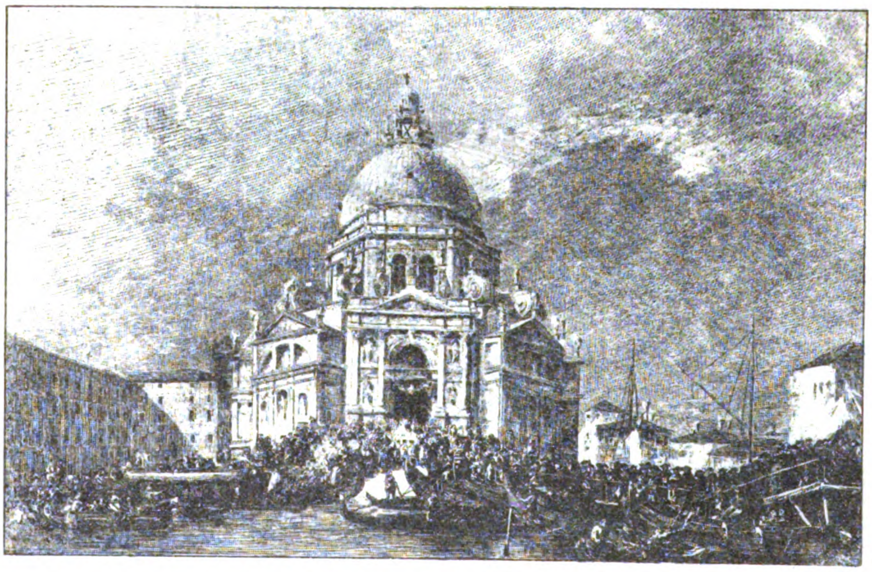
Architects, M. Mayeux. 14



HANGES · XVIII ·

HATCHETT'S HOTEL & WHITE HORSE CELLARS PICCADILLY W

W. S. WEATHERLEY AND F. E. JONES ARCHITECTS



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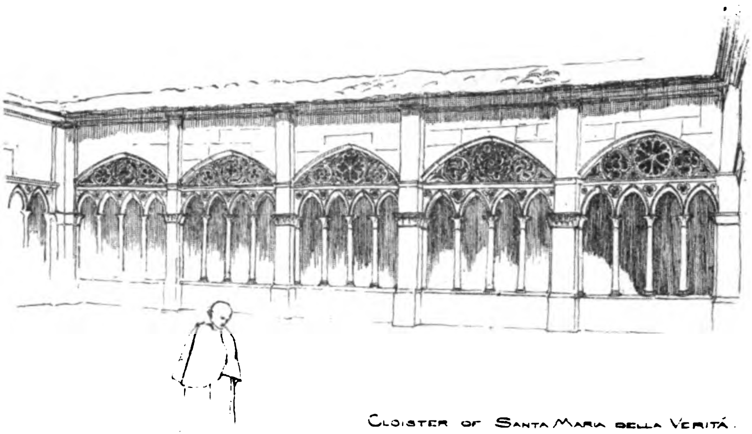
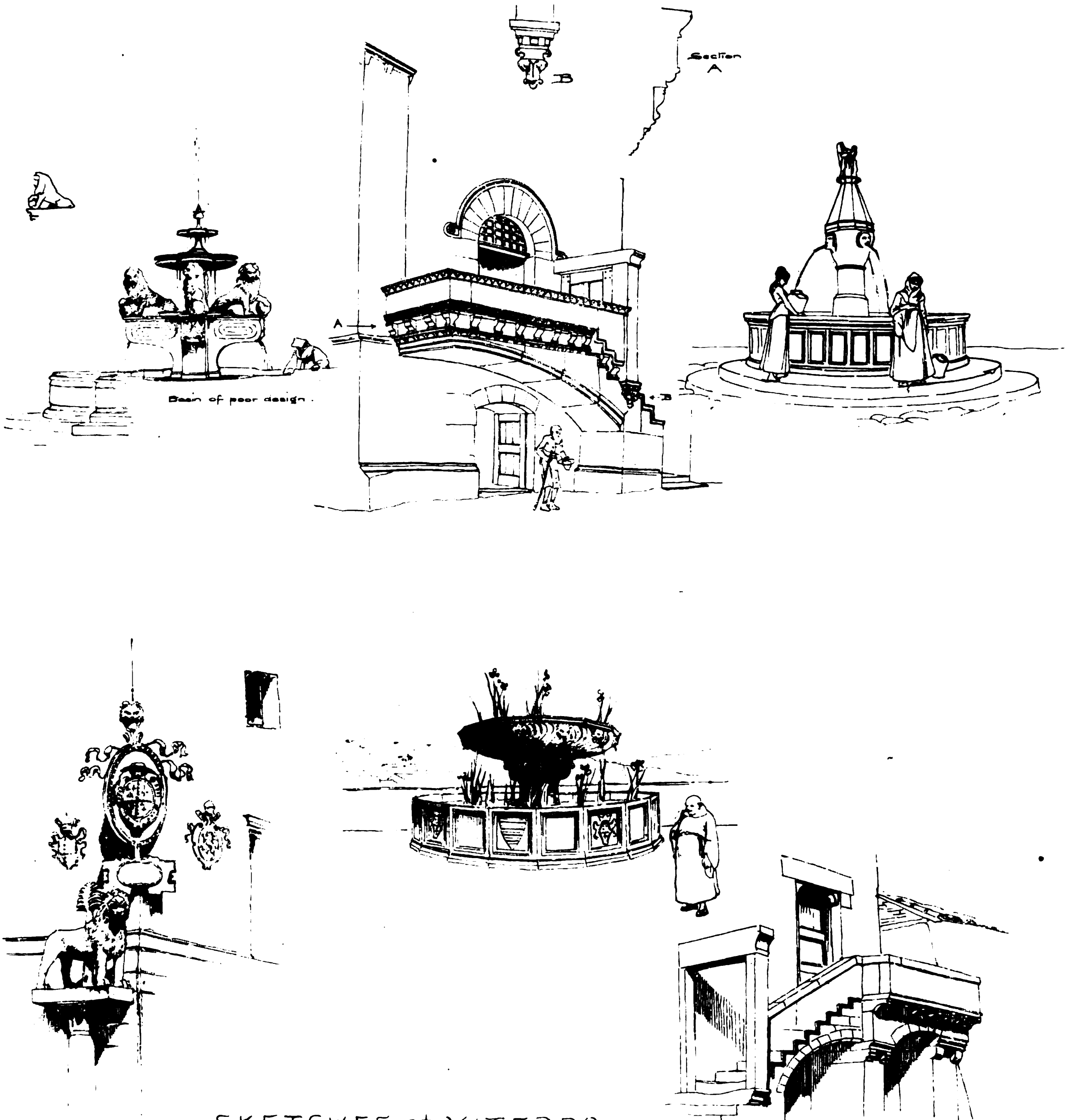
AMERICAN ARCHITECT AND BUILDING NEWS AUG. 25 1883. No. 400



CLOISTER OF SANTA MARIA DELLA VERITÁ.



SKETCHES at VITERBO

CHW

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[illegible] 1/-

Heliotype Printing Co. Boston

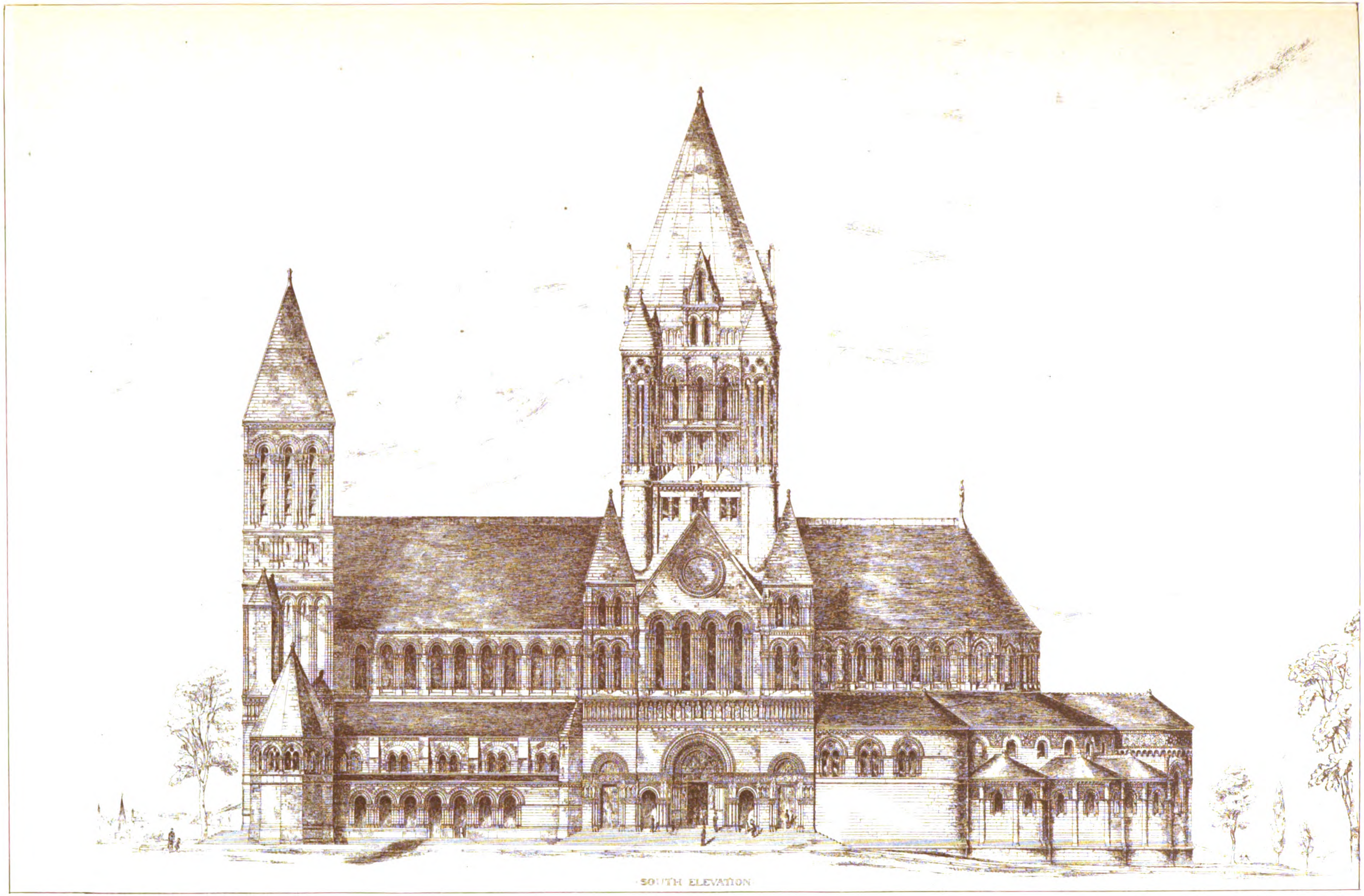
+ DESIGN FOR THE CATHEDRAL

H·H·RICHARDS

LDSGOOD & Cº

ALL SAINTS, ALBANY, N.Y.

, ARCHITECT.



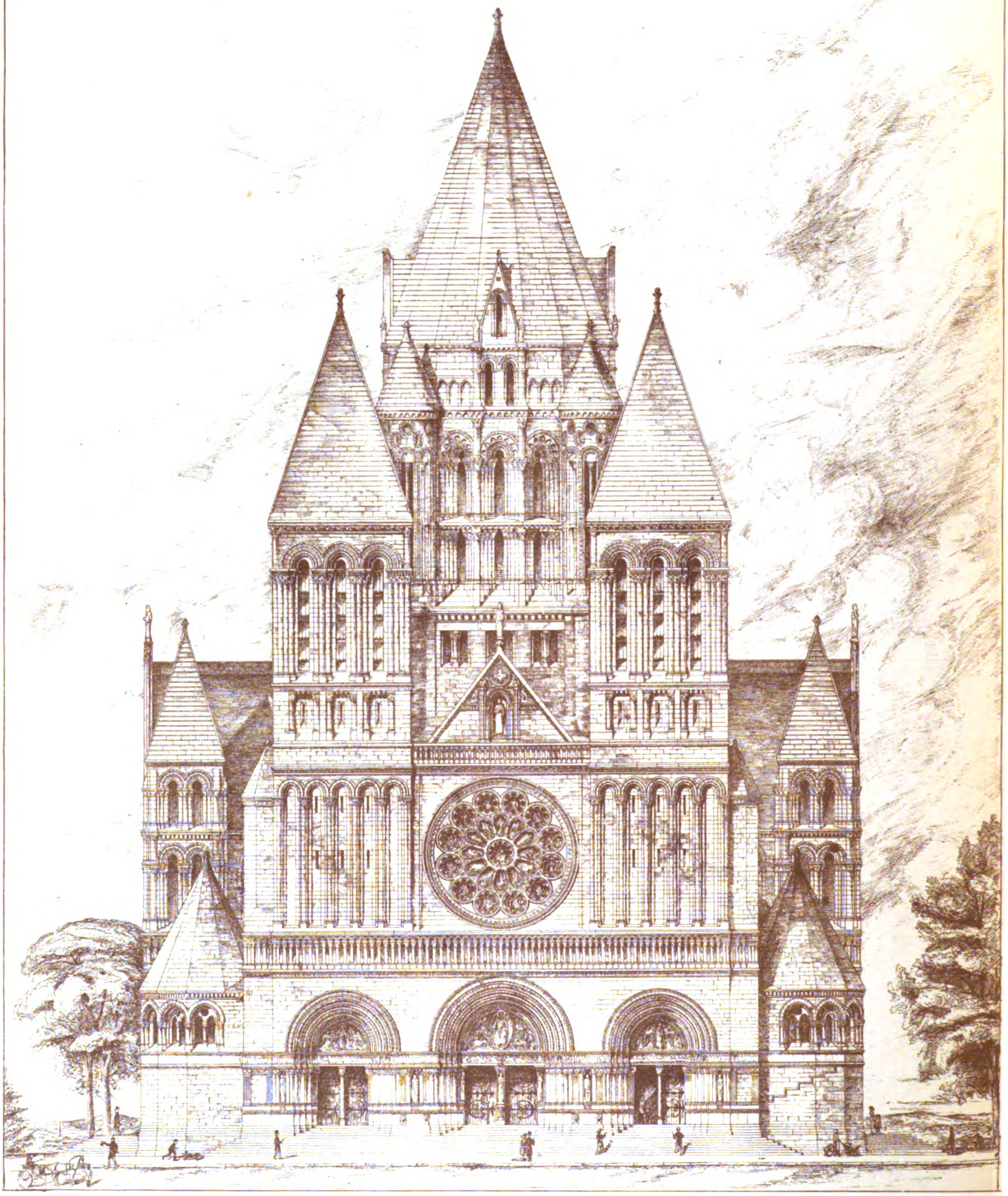
Heliotype Printing Co. 211 Tremont St. Boston.

+ DESIGN FOR THE CATHEDRAL OF ALL SAINTS, ALBANY, N.Y. +

H. H. RICHARDSON, ARCHITECT. ✳

Design for All Saints' Cathedral Albany · · N · Y ·

H · H · Richardson, Architect.

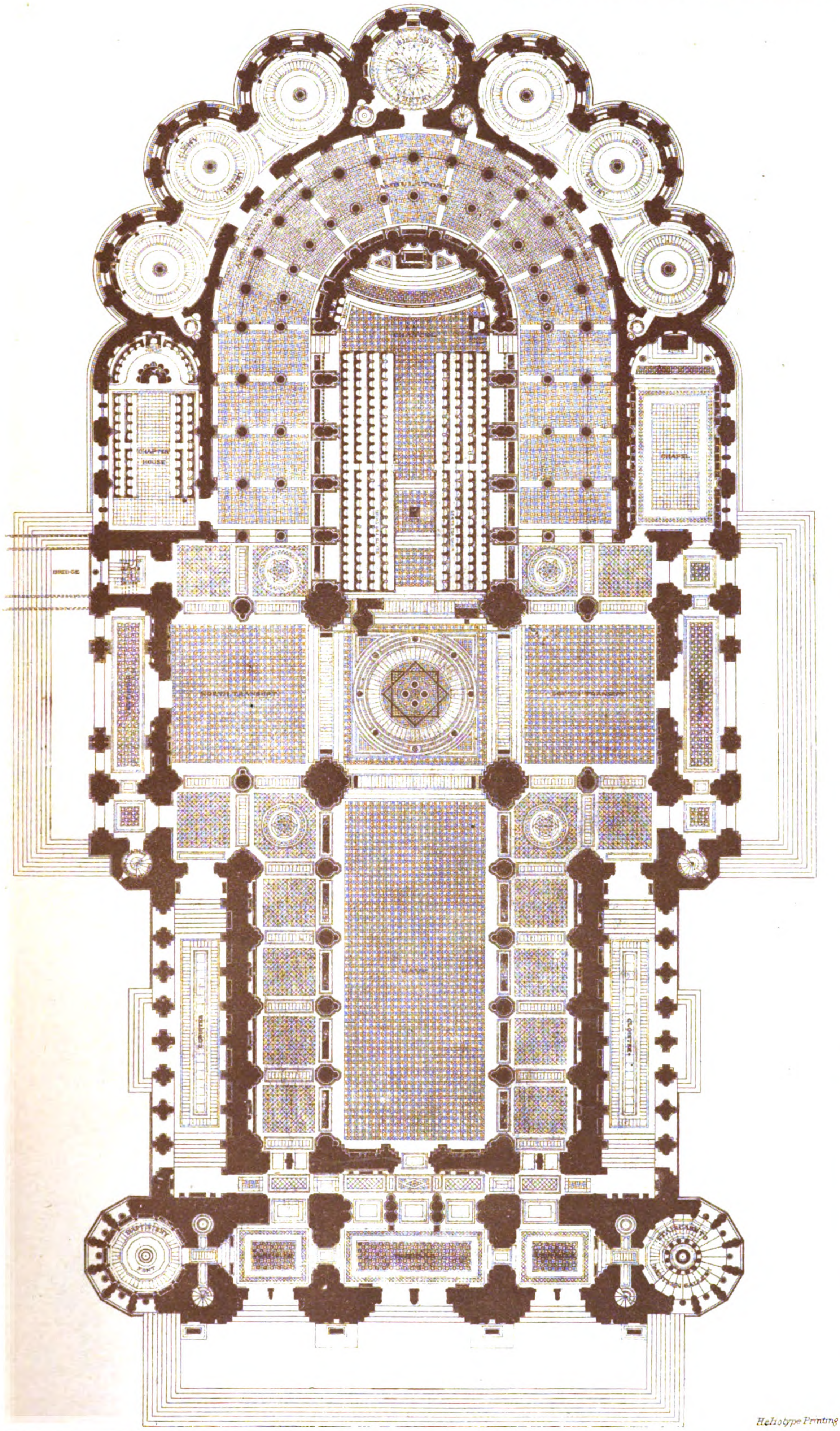


· West Elevation ·

Heliotype Printing Co. 211 Tremont St Boston

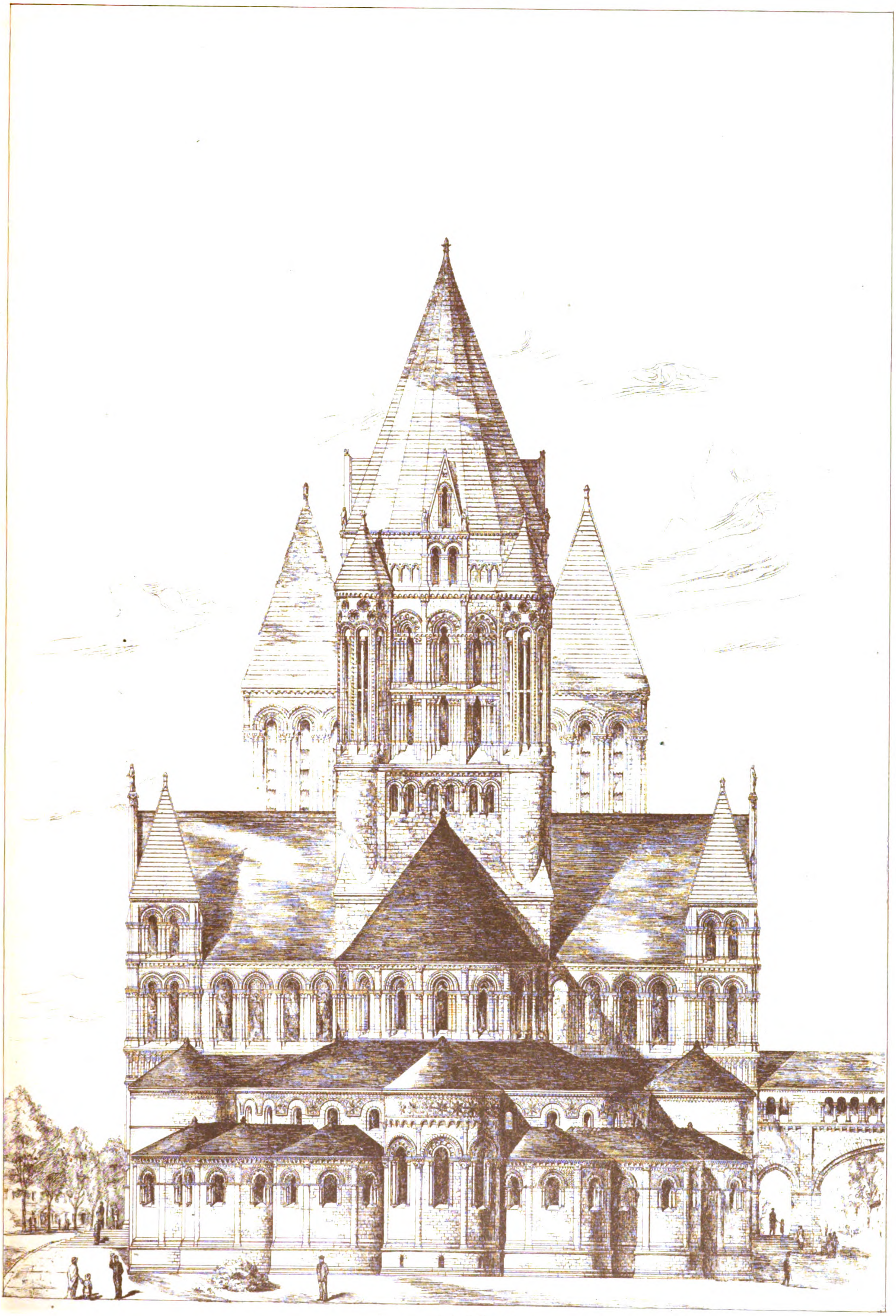
Design for All Saints' Cathedral Albany · · N · Y ·

H · H · Richardson, Architect.



Heliotype Printing Co.

·PLAN·



[illegible] ELEVATION

+ DESIGN FOR THE CATHEDRAL OF ALL SAINTS, ALBANY, N.Y. +

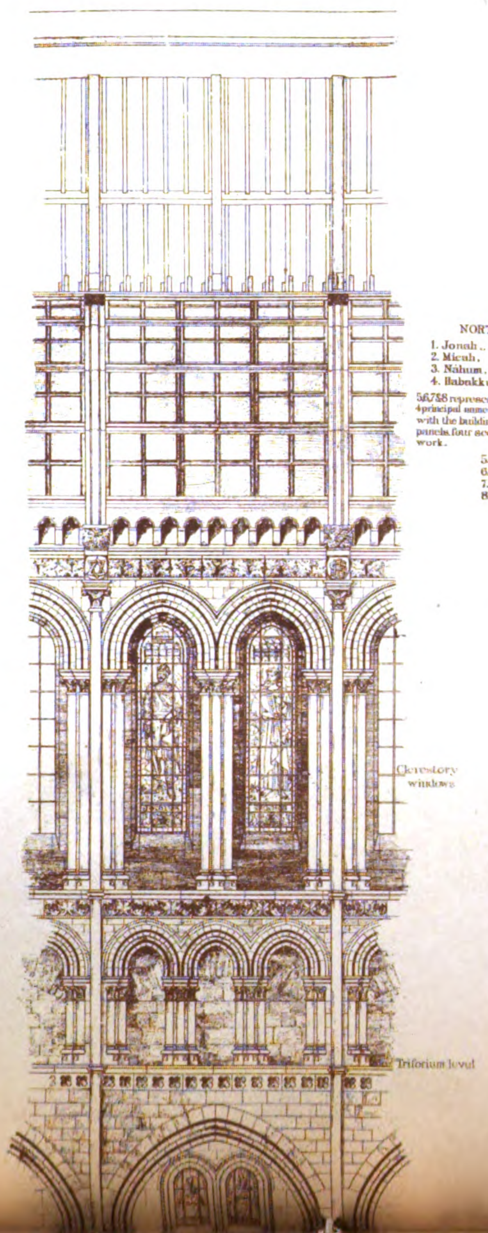
H. H. RICHARDSON, ARCHITECT. ✳

AMERICAN ARCHITECT AND BUILDING NEWS. SEPT. 1, 1883. No. 401

DESIGN FOR THE CATHEDRAL OF ALL · SAINTS · ALBANY · N·Y

DETAIL DRAWING

H·H·RICHARDSON, ARCHITECT. ✠



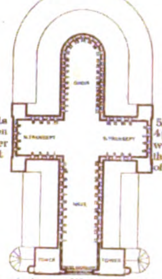
It is intended that the Clerestory windows in Nave, Transepts and Choir shall be filled with Stained Glass to illustrate the whole Bible by the representation of the principal characters of Scripture. Thus in the Nave windows, will be illustrated the Old Testament, in the Transepts the Prophets and the builders of the Tabernacle and the Temple, and in the Choir the New Testament. The scheme is given below.

CHOIR.

The disposition of the 25 windows of the Choir Clerestory, is as follows; commencing with left hand side on entering.

1. Simon Peter.	15. Angel adoring.
2. Andrew.	16. Angel adoring.
3. Thomas.	17. St. Mark.
4. James, son of Alphæus	18. St. John.
5. Judas, brother of James	19. Matthias.
6. Simon the Canaanite	20. Mary, Mother of Jesus.
7. Philip.	21. Lazarus.
8. Bartholomew.	22. Paul.
9. James, brother of John	23. Silas.
10. St. Matthew.	24. Stephen.
11. St. Luke.	25. John the Baptist.
12. Angel adoring.	26. Nicodemus.
13. Angel adoring.	27. Joseph of Arimathea.

14. Christ, throned in Glory, comes in the centre window, and on either side are angels adoring; beyond them on either side stand the four Evangelists.



NORTH TRANSEPT.

1. Jonah.	9. Zephaniah.
2. Micah.	10. Haggai.
3. Nahum.	11. Zechariah.
4. Habakkuk.	12. Malachi.

5,6,7&8 represent in upper compartments 4 principal names mentioned in connection with the building of the Temple; the lower panels four scenes representing that work.

5. Huram.
6. Solomon.
7. Hiram.
8. Adoniram.

SOUTH TRANSEPT.

1. Isaiah.	9. Hosea.
2. Jeremiah.	10. Joel.
3. Ezekiel.	11. Amos.
4. Daniel.	12. Obadiah.

5,6,7&8 represent in upper compartments 4 principal names mentioned in connection with the construction of the Tabernacle; the lower panels four scenes illustrative of that work.

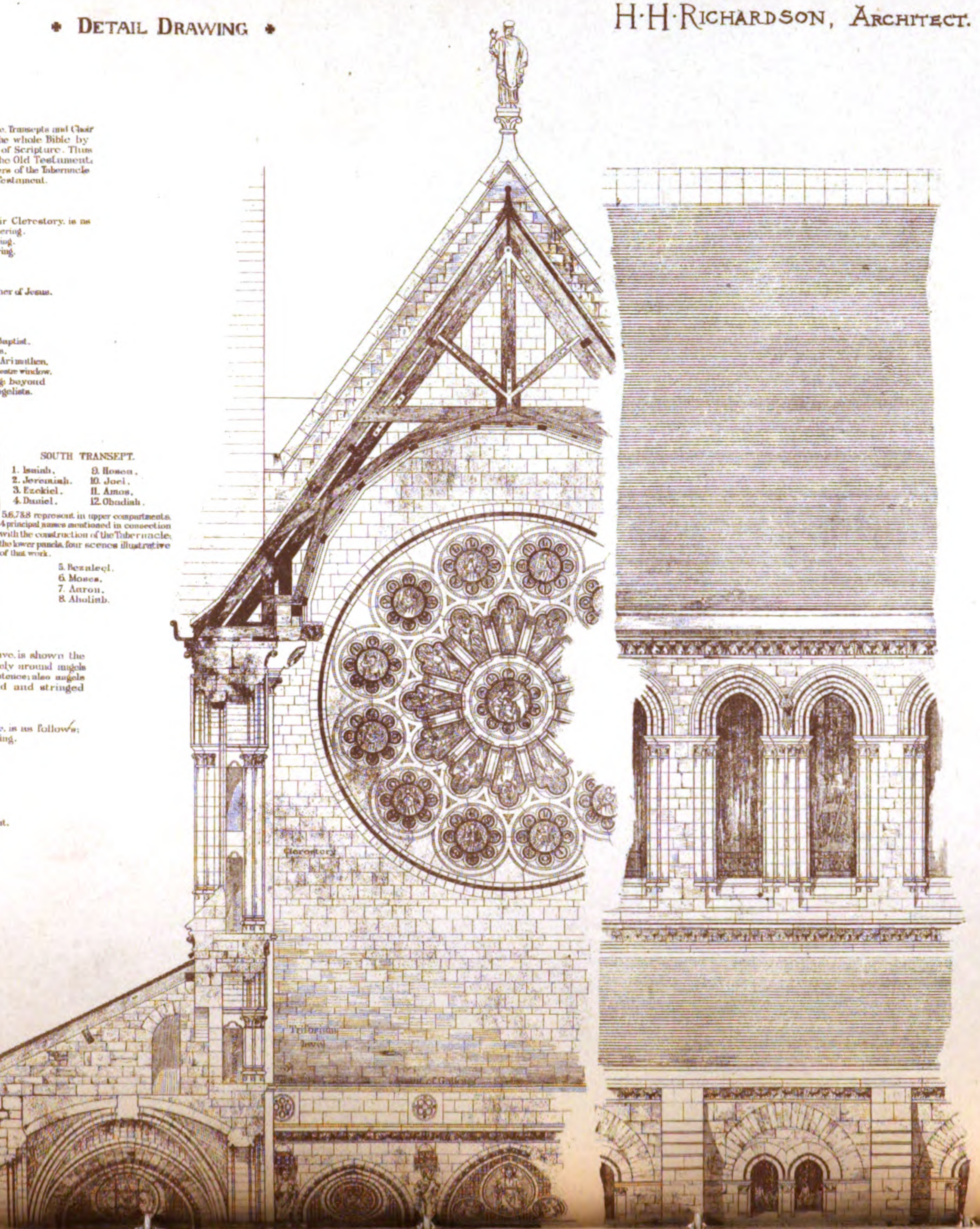
5. Bezaleel.
6. Moses.
7. Aaron.
8. Aholiab.

In the large Rose window at West end of Nave, is shown the Word of God throned in centre, and immediately around angels hastening away to awaken the Earth into existence; also angels in the outer circles praising God upon wind and stringed instruments.

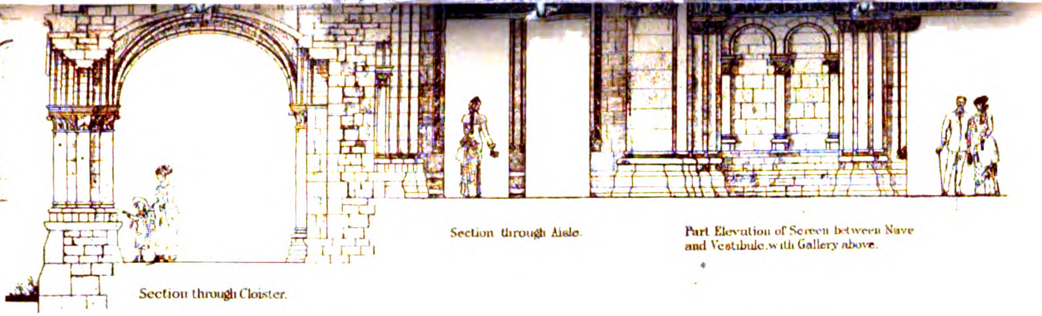
NAVE.

The arrangement of the 22 windows of Nave, is as follows; commencing with the left hand side on entering.

1. Adam.	12. Samson.
2. Noah.	13. Samuel.
3. Abraham.	14. Saul.
4. Isaac.	15. David.
5. Jacob.	16. Solomon.
6. Joseph.	17. Elijah.
7. Moses.	18. Elisha.
8. Aaron.	19. Jehoshaphat.
9. Joshua.	20. Hezekiah.
10. Deborah.	21. Joshua.
11. Gideon.	22. Job.



INTERIOR ELEVATION OF ONE BAY OF NAVE.

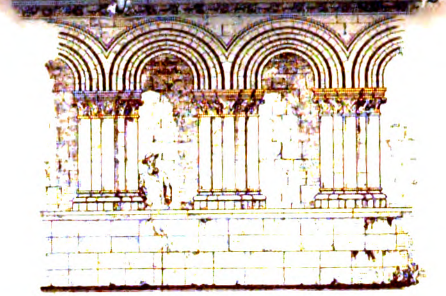


Section through Cloister.

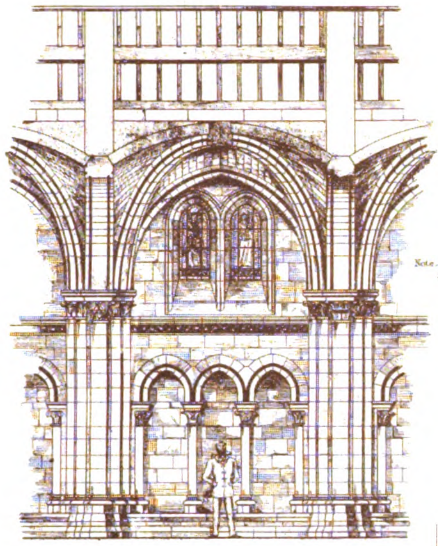
Section through Aisle.

Part Elevation of Screen between Nave and Vestibule, with Gallery above.

SECTION THROUGH ONE BAY OF NAVE, AISLE AND CLOISTER.

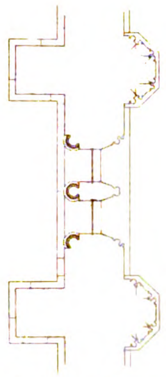


EXTERIOR ELEVATION OF ONE BAY OF NAVE.

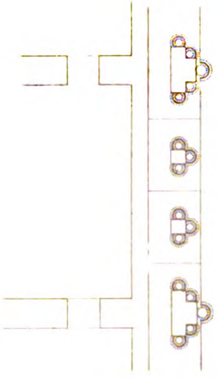


Note. Subjects for Stained Glass in Aisles are the Emblems of the Church of Christ &c.

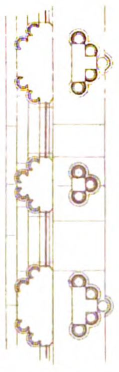
Longitudinal Section through one Bay of South Aisle.



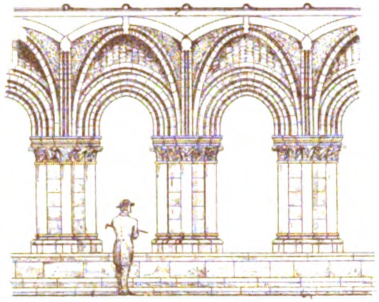
Plan through Aisles to Windows.



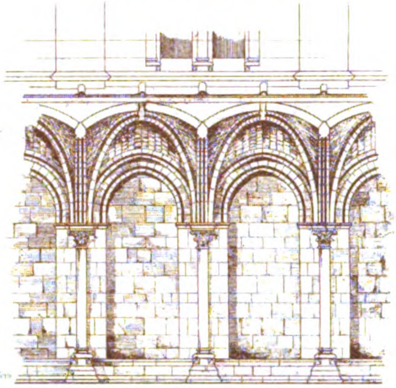
Plan at Triforium level.



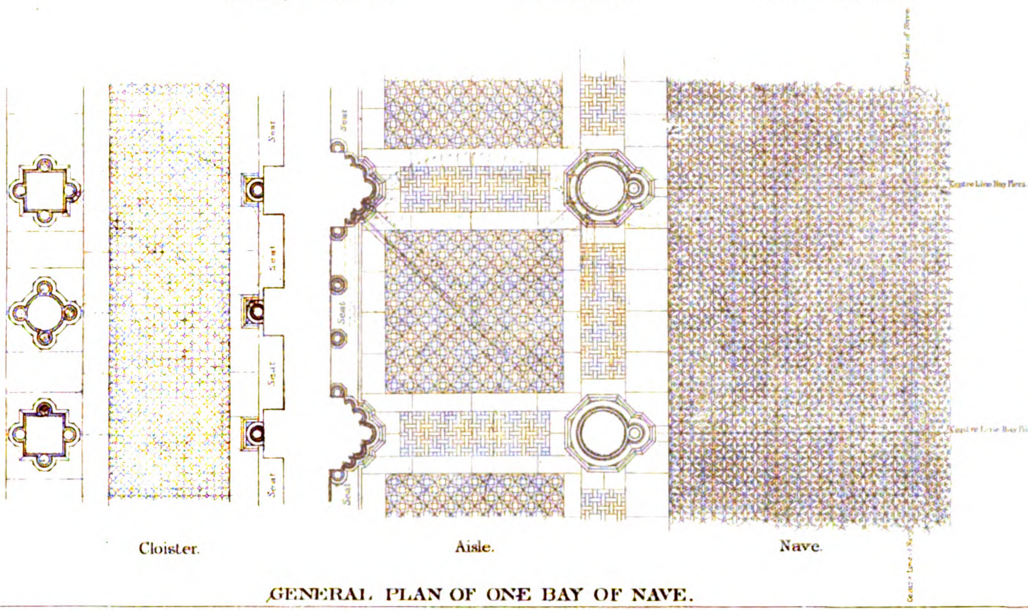
Plan of Clerestory Windows.



Longitudinal Section through two Bays, South Cloister, looking South.

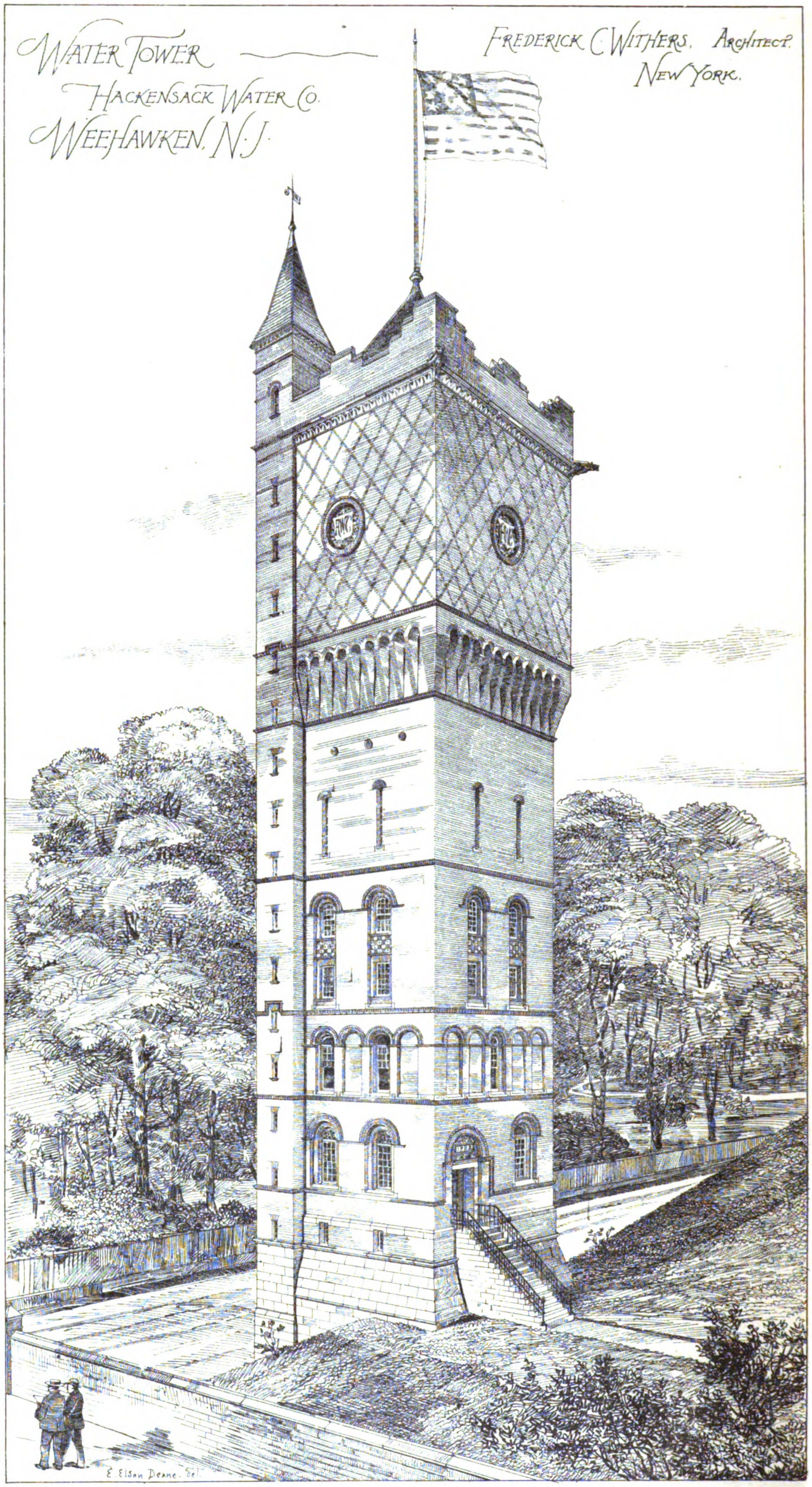


Longitudinal Section through two Bays, South Cloister, looking North.



GENERAL PLAN OF ONE BAY OF NAVE.

No. 402 American Architect and Building News, Sept. 8, 1883.

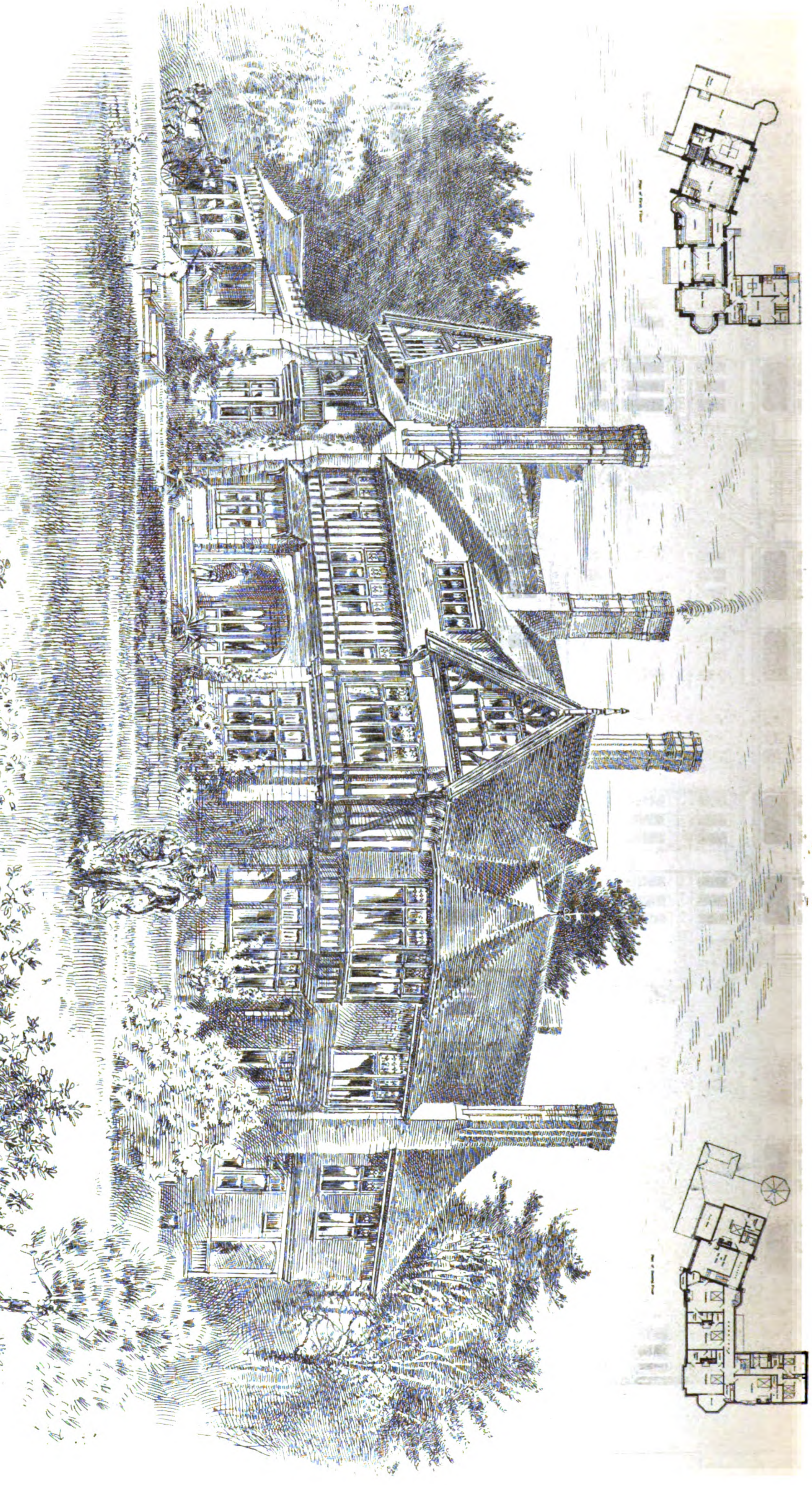


Water Tower
Hackensack Water Co.
Weehawken, N. J.

Frederick C. Withers, Architect.
New York.

Heliotype Printing Co. 211 Tremont St. Boston.

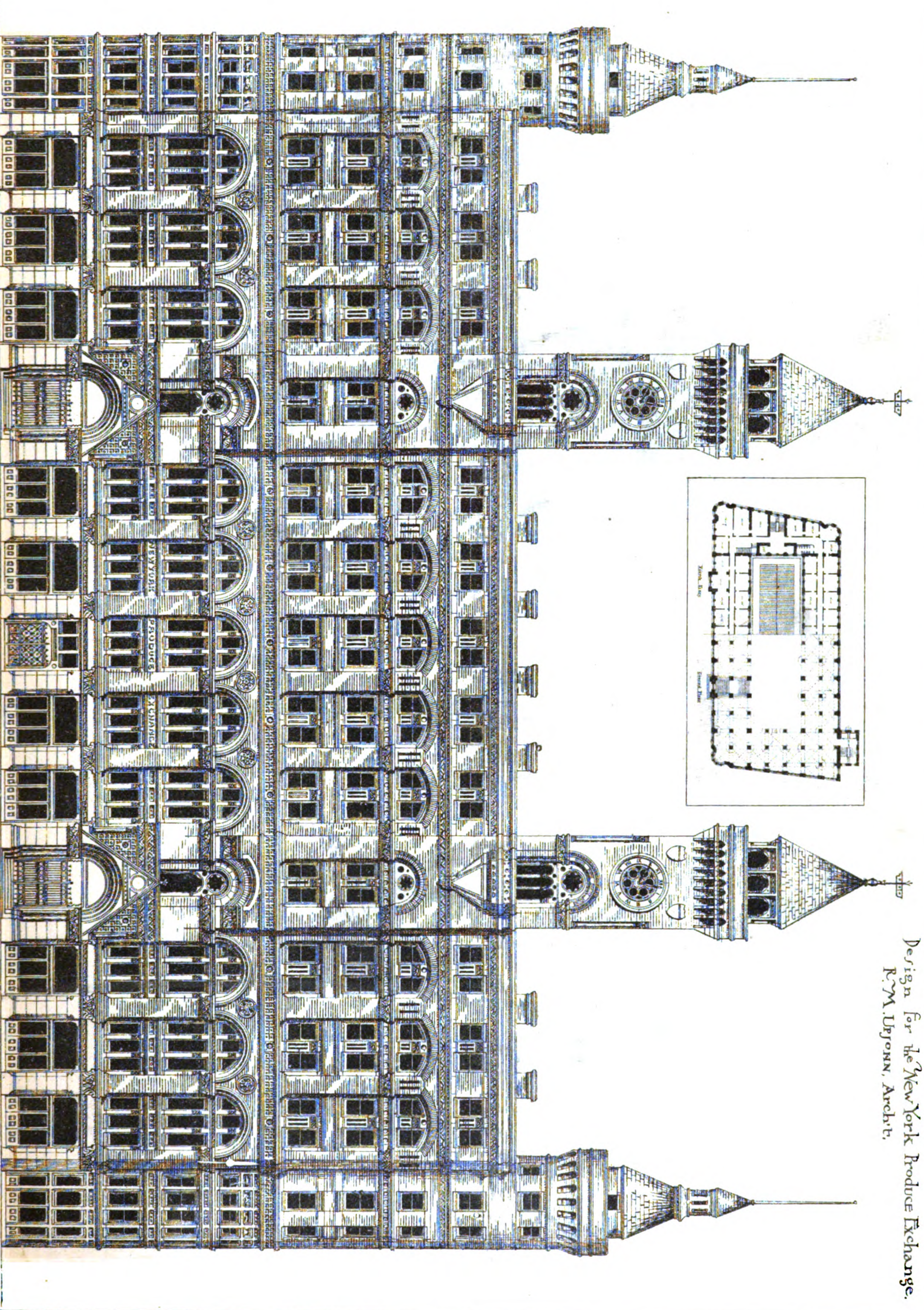
No 402 AMERICAN ARCHITECT AND BUILDING NEWS, SEPT. 8, 1883.



Brownleigh Hall Wellesley U.S.A.

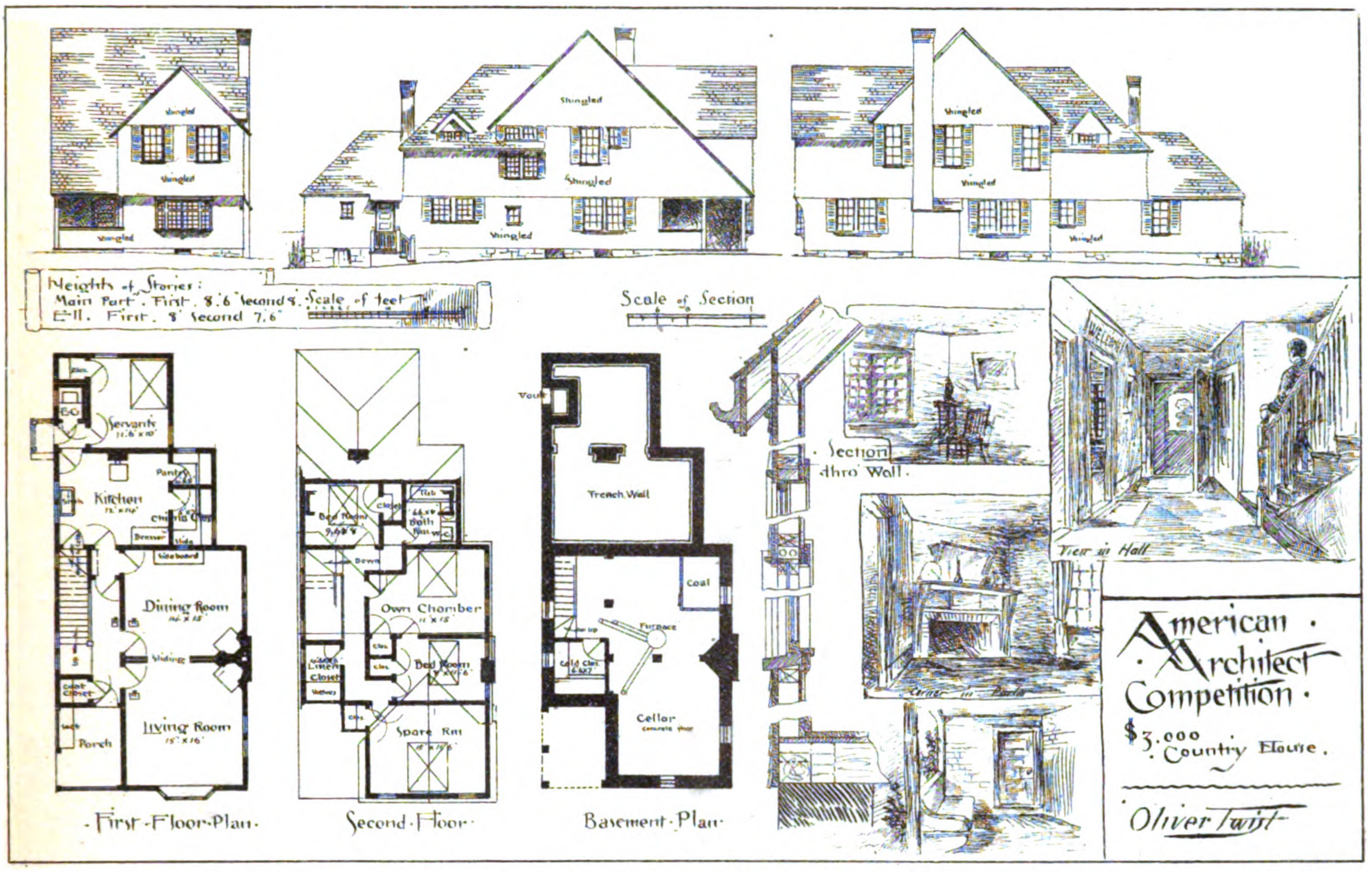
Allen and Kenway Architects Boston

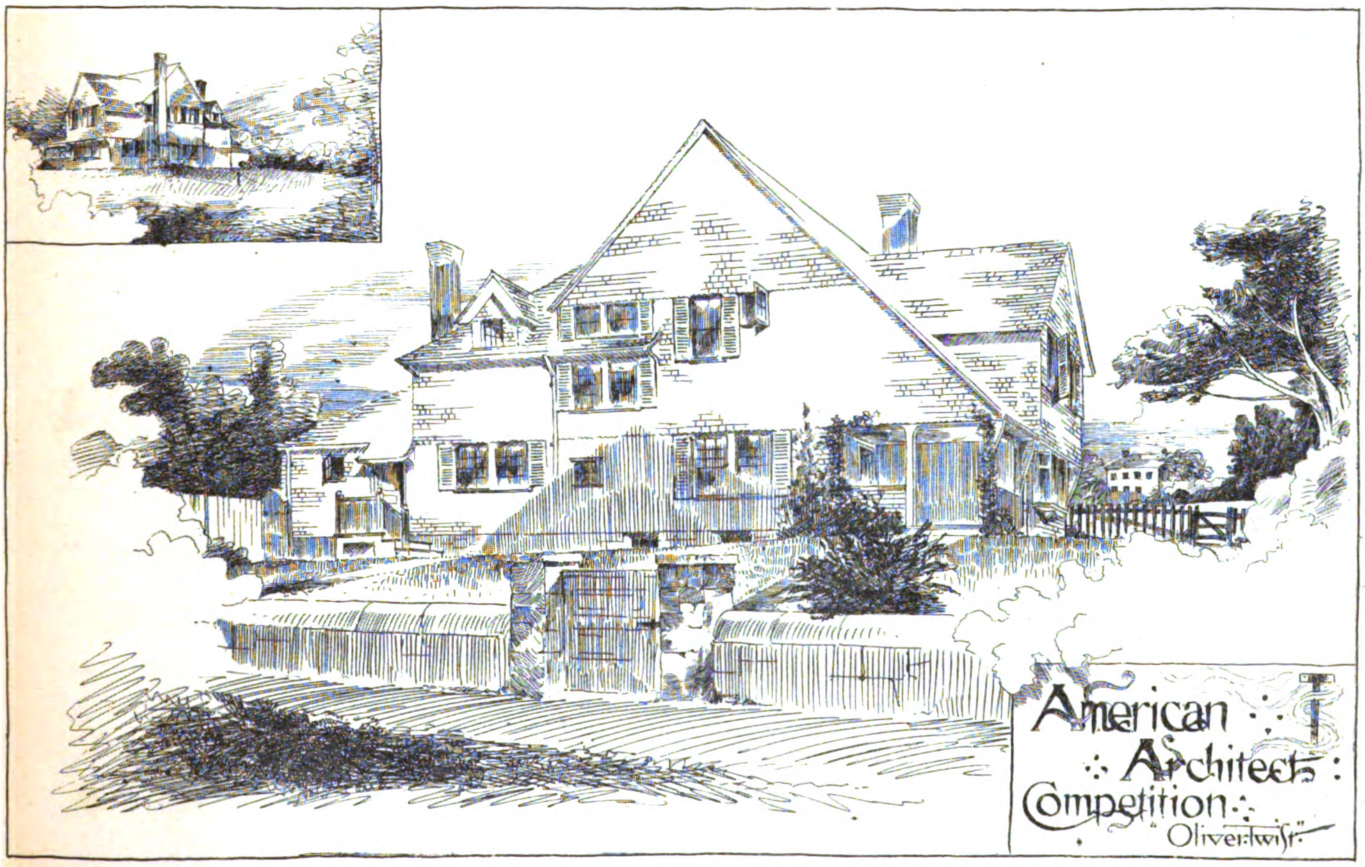
Heliotype Printing Co. 211 Tremont St. Boston.



Design for the New York Produce Exchange.
R. M. Upjohn, Archt.

Heliotype Printing Co. 211 Tremont St. Boston

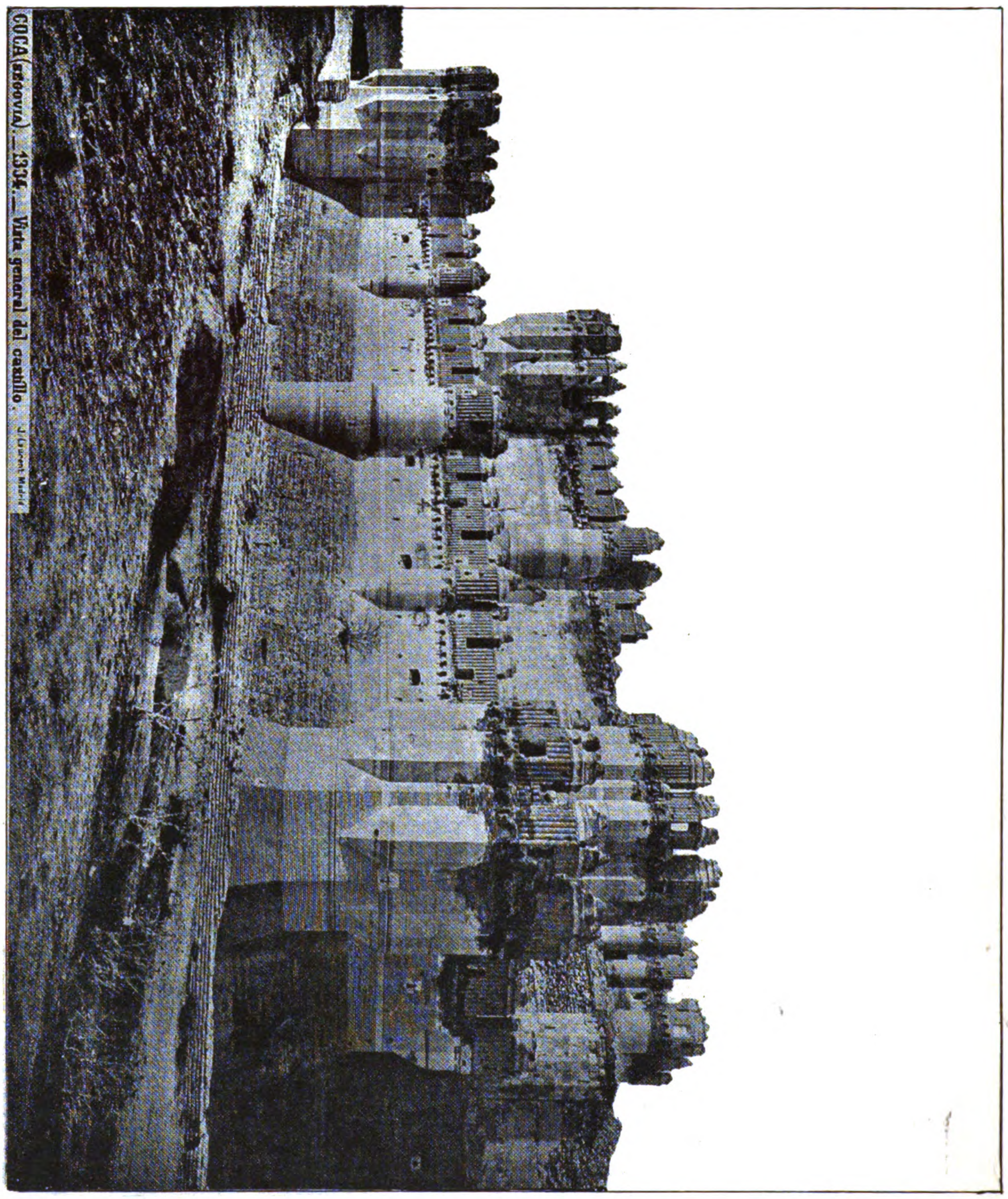




Heliotype Printing Co. 211 Tremont St. Boston.

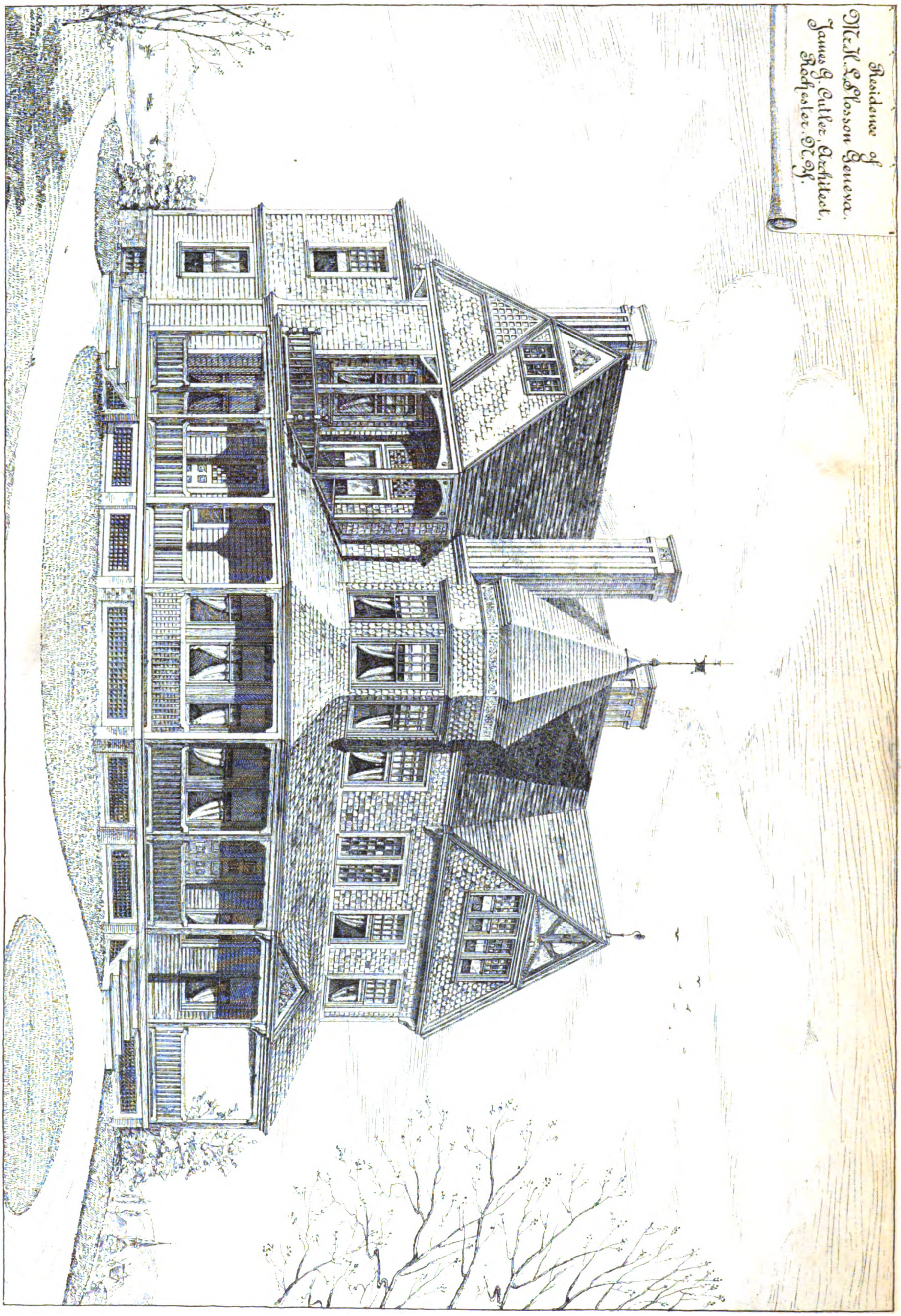
Sept 15 - 1862

No. 403 AMERICAN ARCHITECT AND BUILDING NEWS, SEPT. 15, 1883.



The Heliotype Printing Co. 211 Tremont St. Boston.

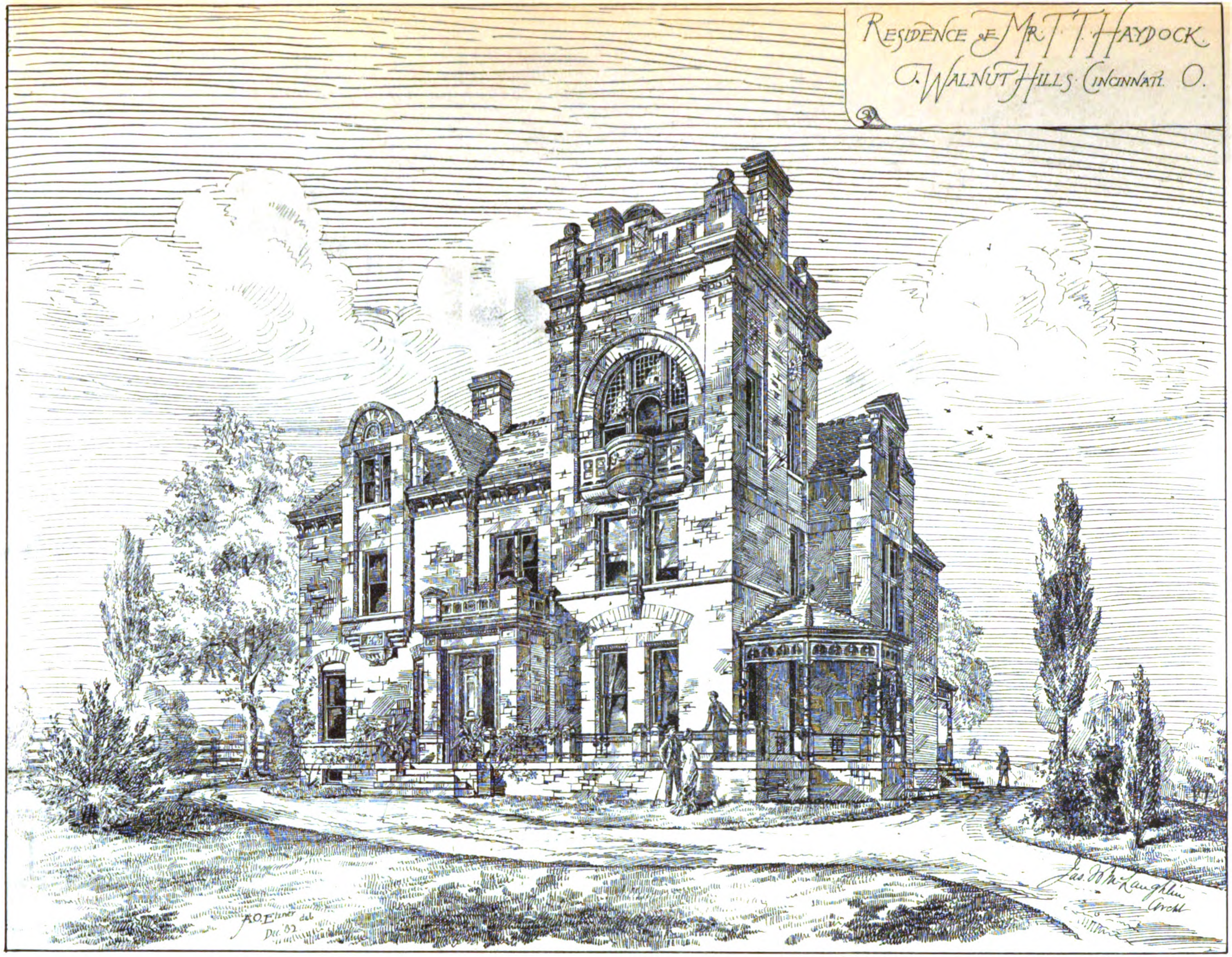
No. 405 American Architect and Building News. Sept. 15. 1883.



Residence of
Mr. H. L. Slosson Geneva.
James G. Cutler, Architect,
Rochester. N. Y.

The Heliotype Printing Co. 211 Tremont St. Boston.

No. 403 American Architect and Building News, Sept. 15, 1883.

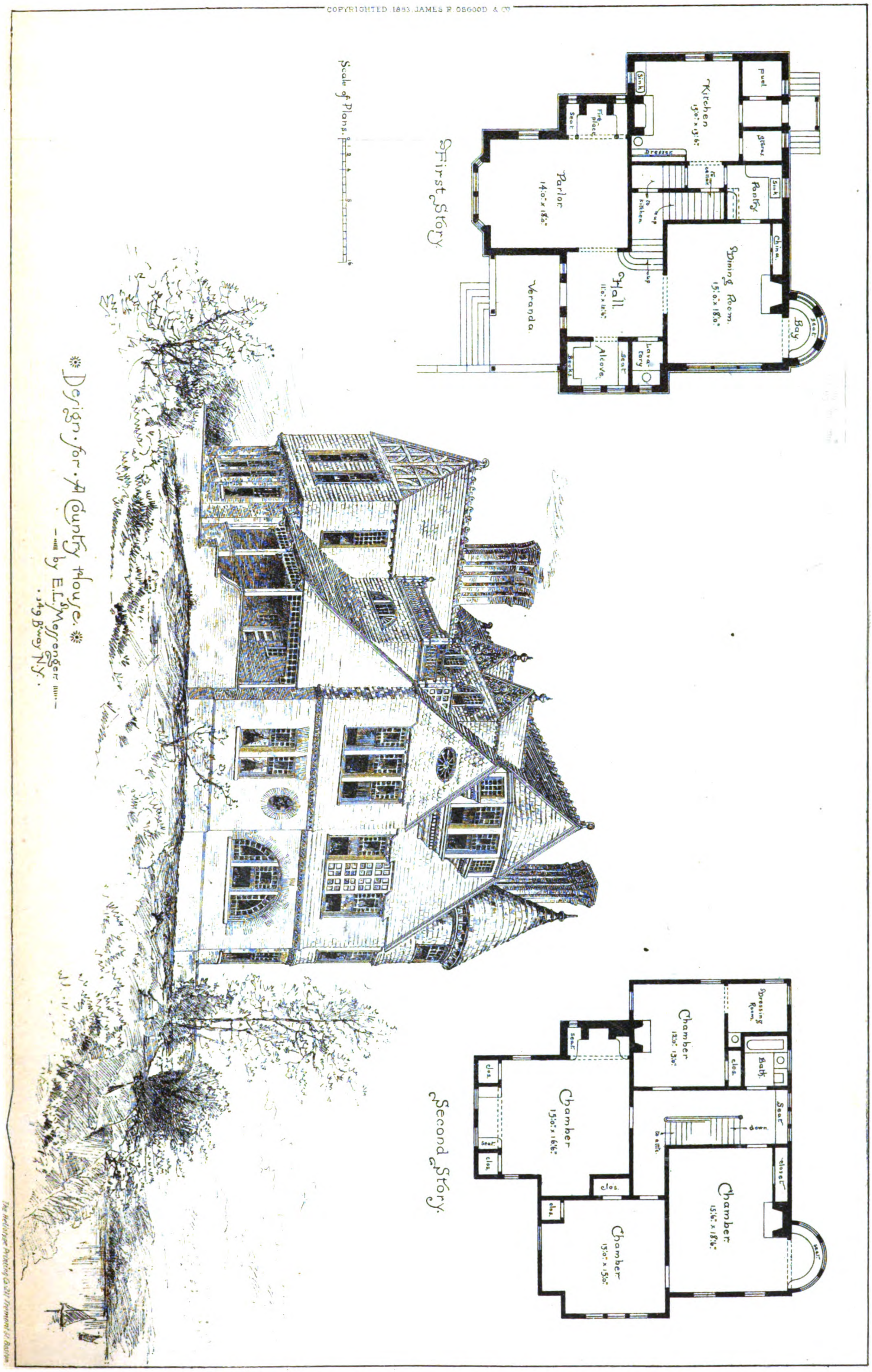


Residence of Mr. T. T. Haydock,
Walnut Hills, Cincinnati, O.

Jas. W. McLaughlin
Archt

A. O. Elzner del
Dec. '82

The Heliotype Printing Co. 211 Tremont St. Boston



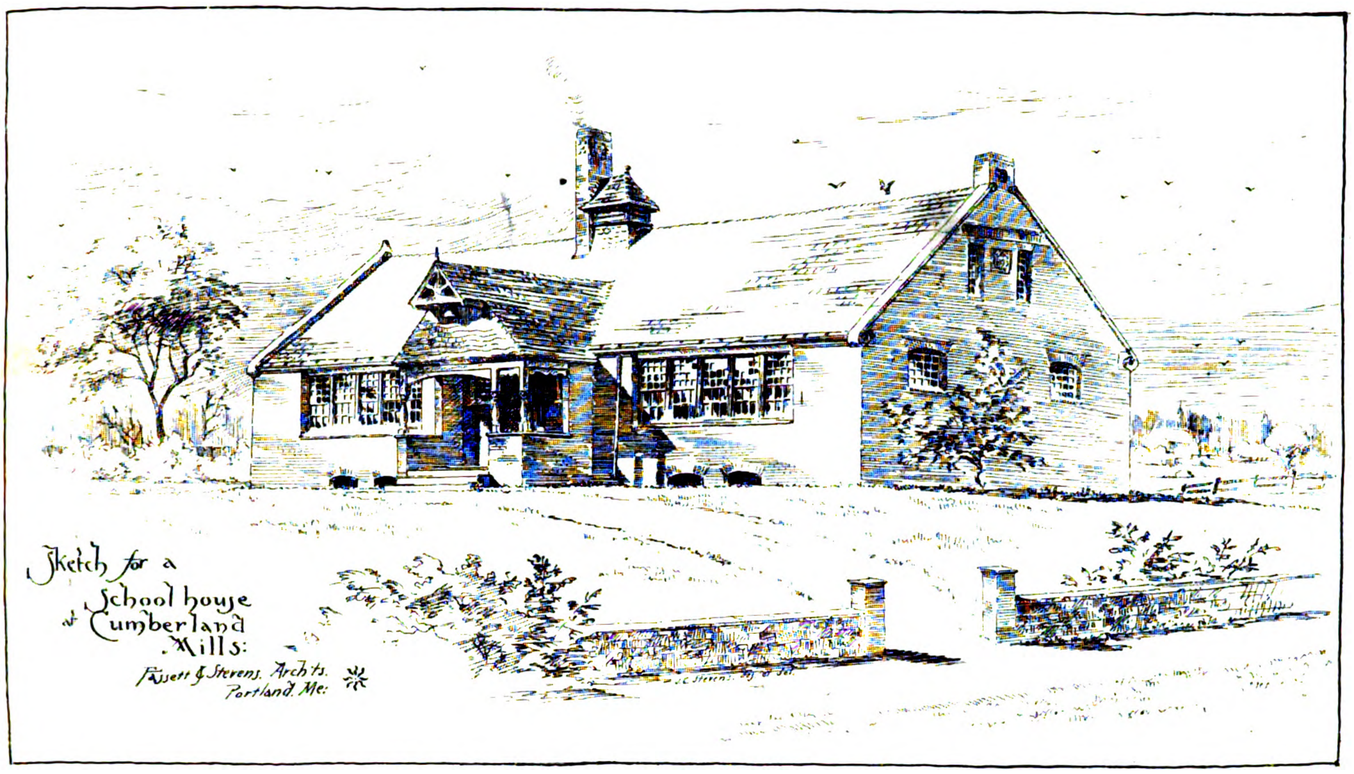
Design for A Country House.

by E. L. Messenger

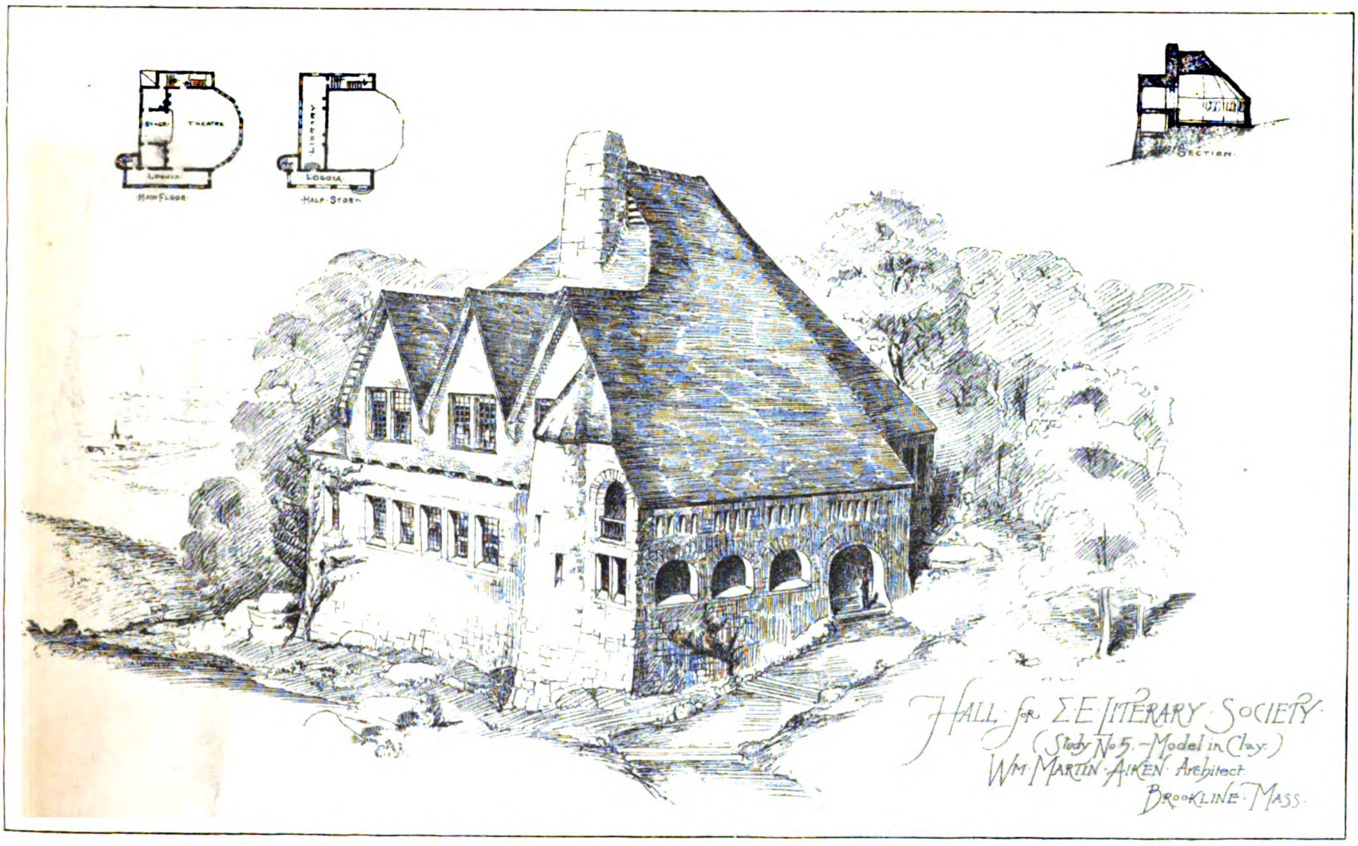
149 B'way N.Y.

The Heliotype Printing Co. 211 Tremont St. Boston.

AMERICAN ARCHITECT AND BUILDING NEWS, SEPT. 15.1883. No. 403



Sketch for a School house at Cumberland Mills:
Fassett & Stevens. Arch'ts. Portland. Me:

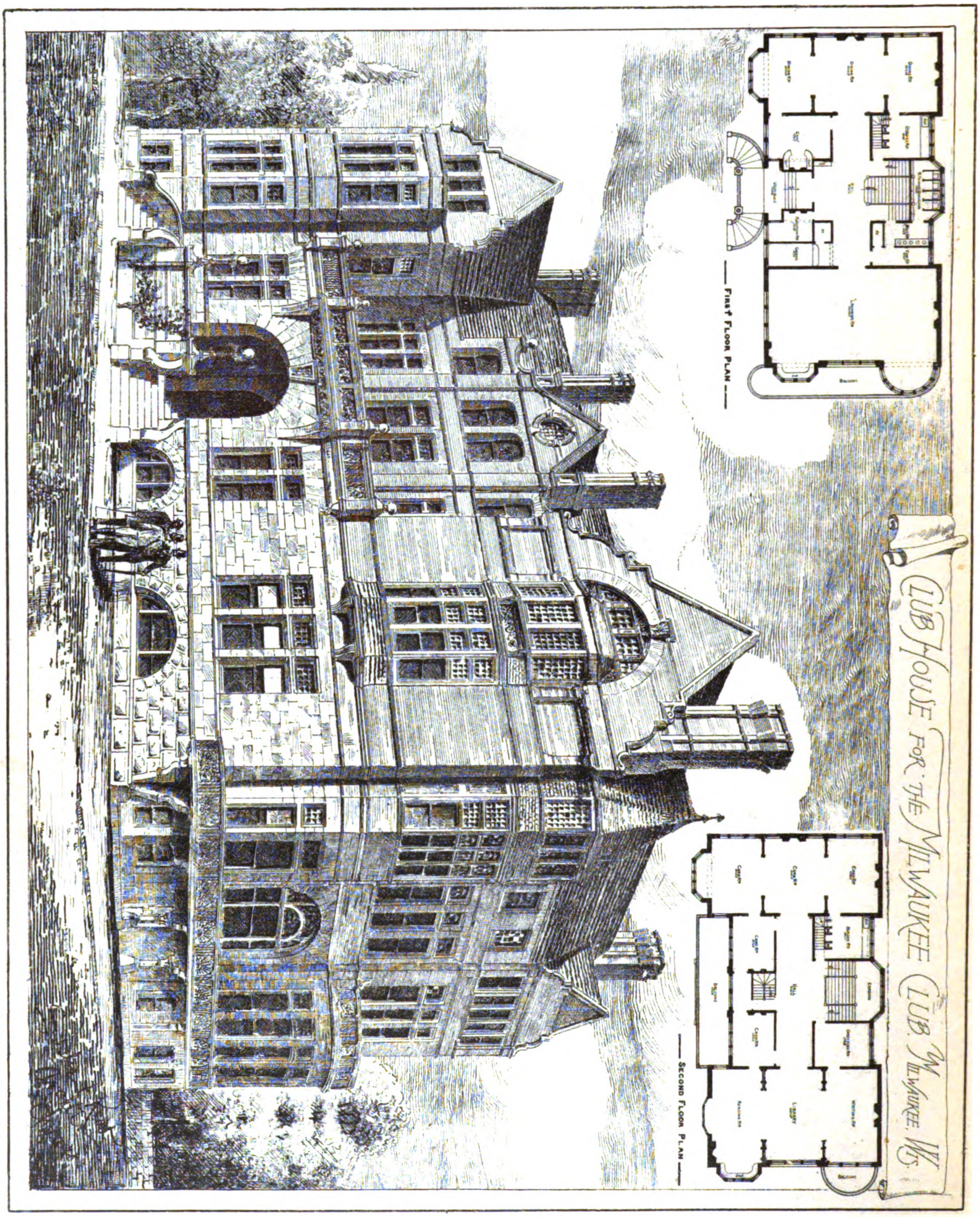


HALL for Σ.E. LITERARY SOCIETY
(Study No 5. – Model in Clay.)
WM. MARTIN AIKEN. Architect
BROOKLINE. MASS.

The Heliotype Printing Co. 211 Tremont St Boston

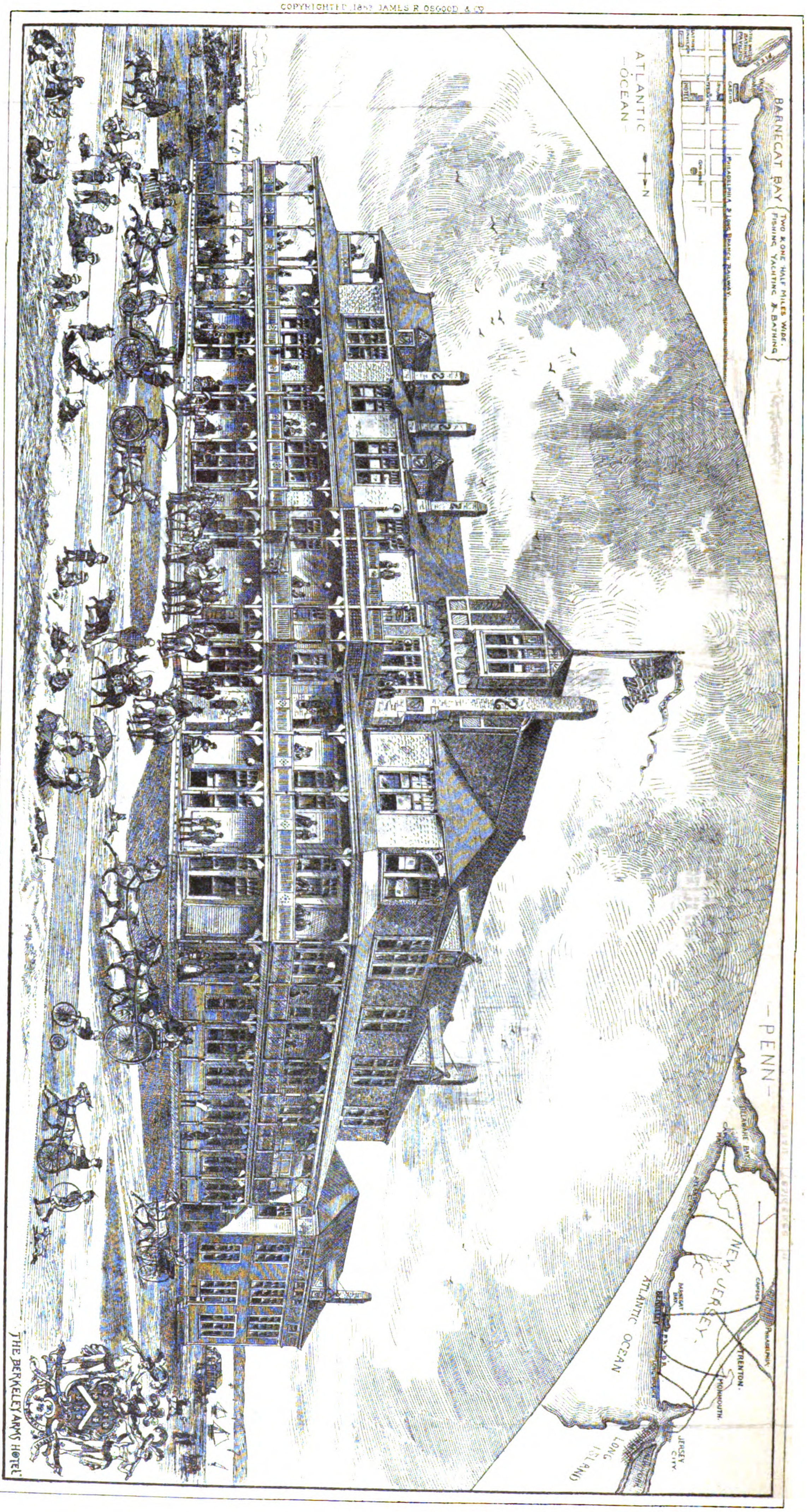
AMERICAN ARCHITECT AND BUILDING NEWS, SEPT. 15, 1883. No. 403

STORE OF R·H·WHITE & CO. BOSTON MASS.
PEABODY & STEARNS, ARCH'TS.



CLUB HOUSE FOR THE MILWAUKEE CLUB, MILWAUKEE, WIS.

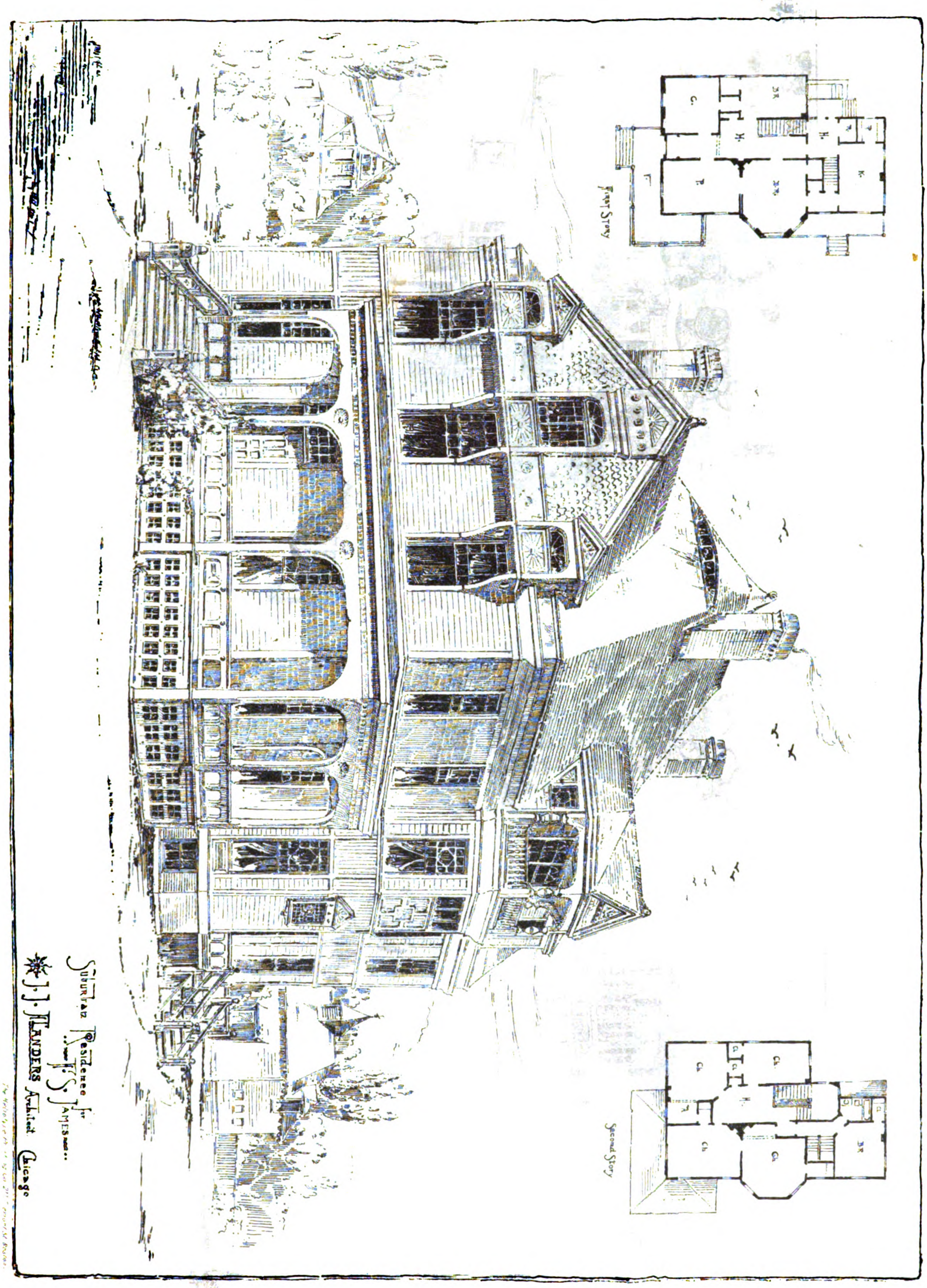
The Heliotype Printing Co. 211 Tremont St. Boston.

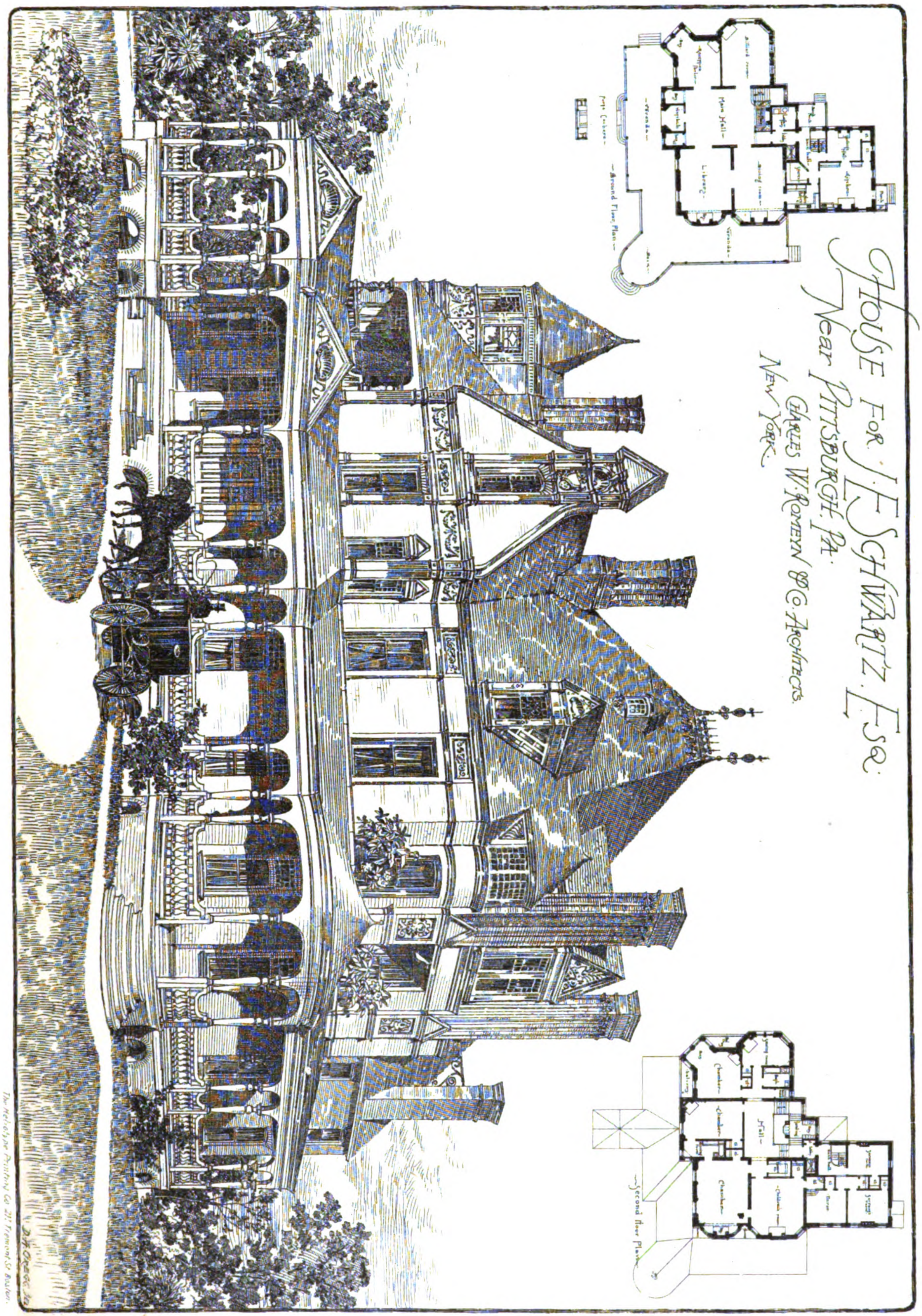


"THE BERKELEY ARMS HOTEL", BERKELEY. N.J. — BRADFORD L. GILBERT. ARCH'T. N.Y.

The Heliotype Printing Co. 211 Tremont St. Boston.

AMERICAN ARCHITECT AND BUILDING NEWS. SEPT. 22. 1883. No. 404





House for J. F. Schwartz, Esq.
Near Pittsburgh, Pa.
Charles W. Romeyn & Co. Architects.
New York.

The Heliotype Printing Co. 211 Tremont St. Boston.

STABLE & COACHMAN'S COTTAGE for
MRS MARK HOPKINS
GT. BARRINGTON, MASS.

The Heliotype Printing Co. 211 Tremont St. Boston

AMERICAN ARCHITECT AND B

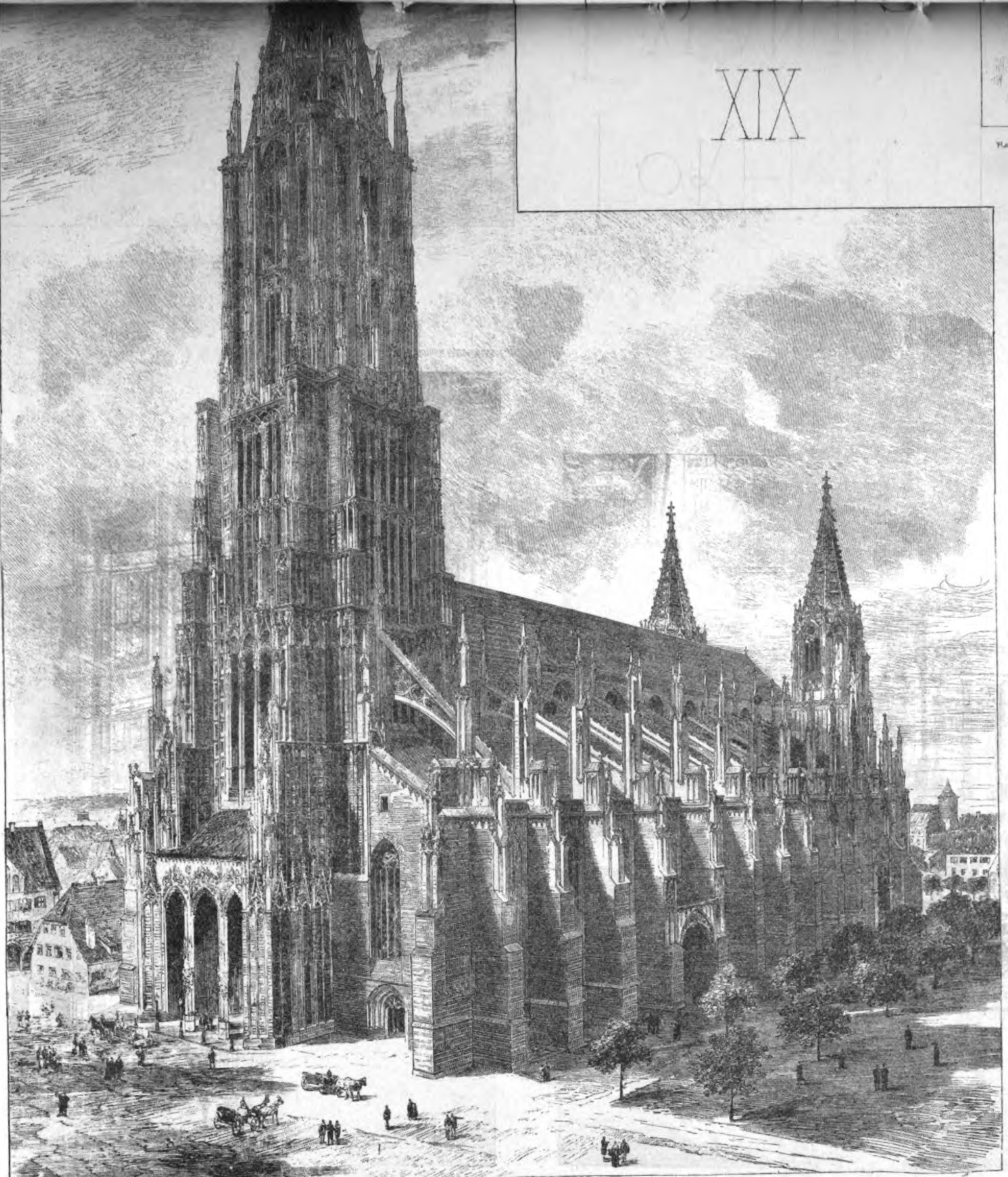
COPYRIGHTED, 1883, JAMES

XIX

Rambling Sketches by T. Raffles Davison
The British Architect.

THE QUINTA SCHOOLS.

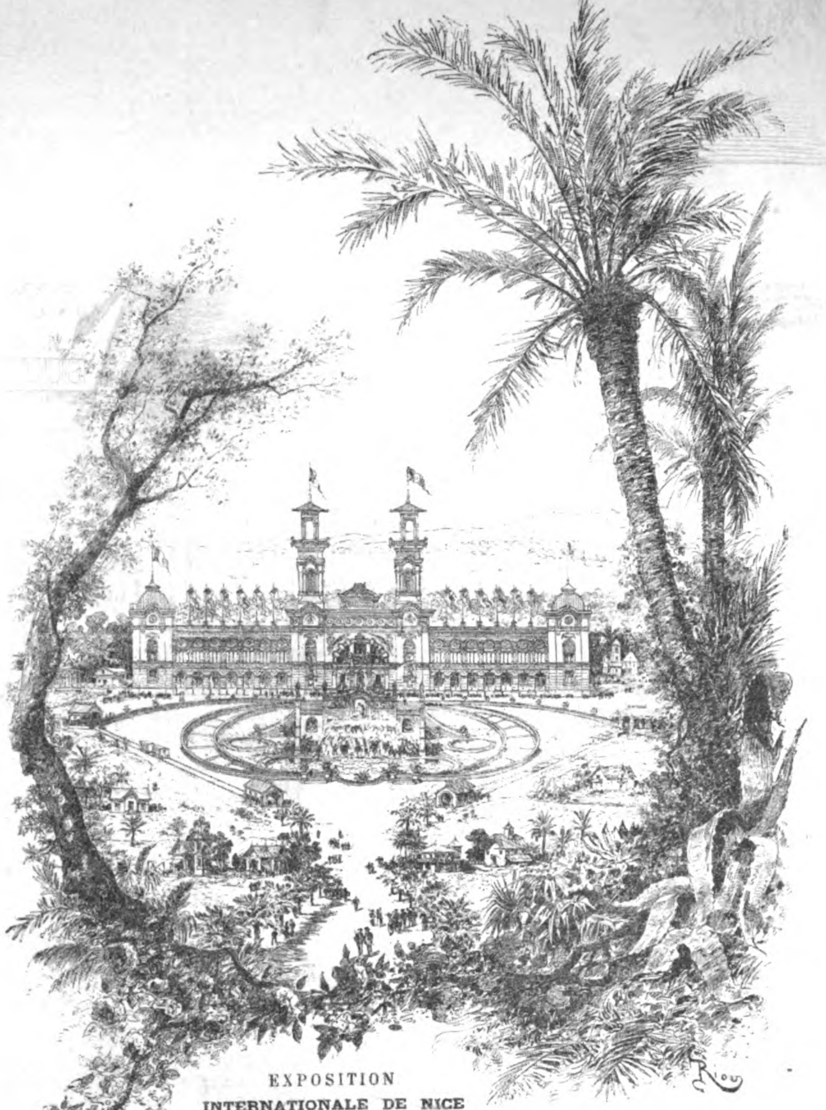
The north-east aspect



THE BUILDER.

The Heliotype Printing Co. 211 Tremont St. Boston.

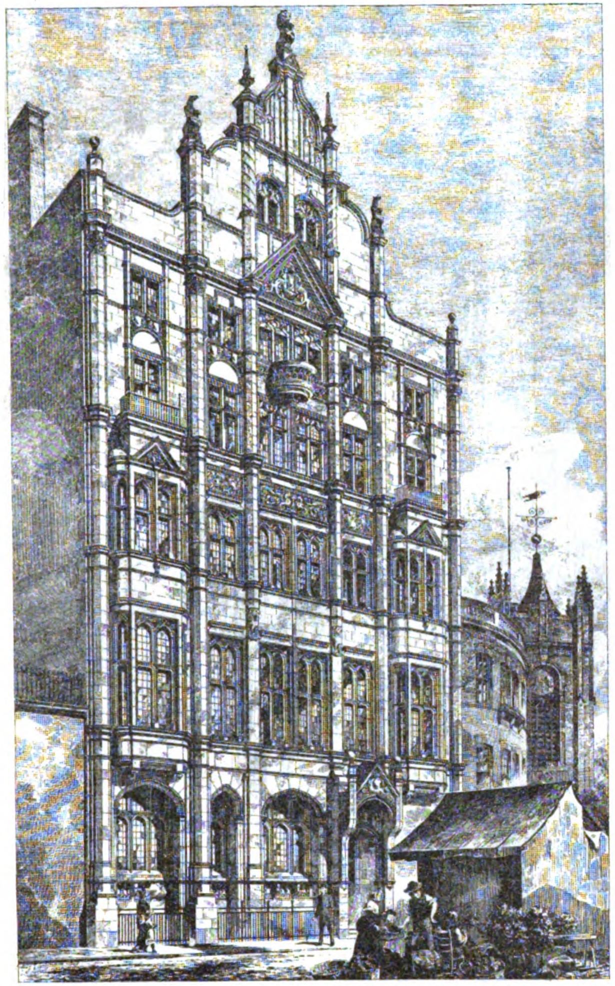
EXTERIOR OF ULM CATHEDRAL: AS PROPOSED TO BE RESTORED.



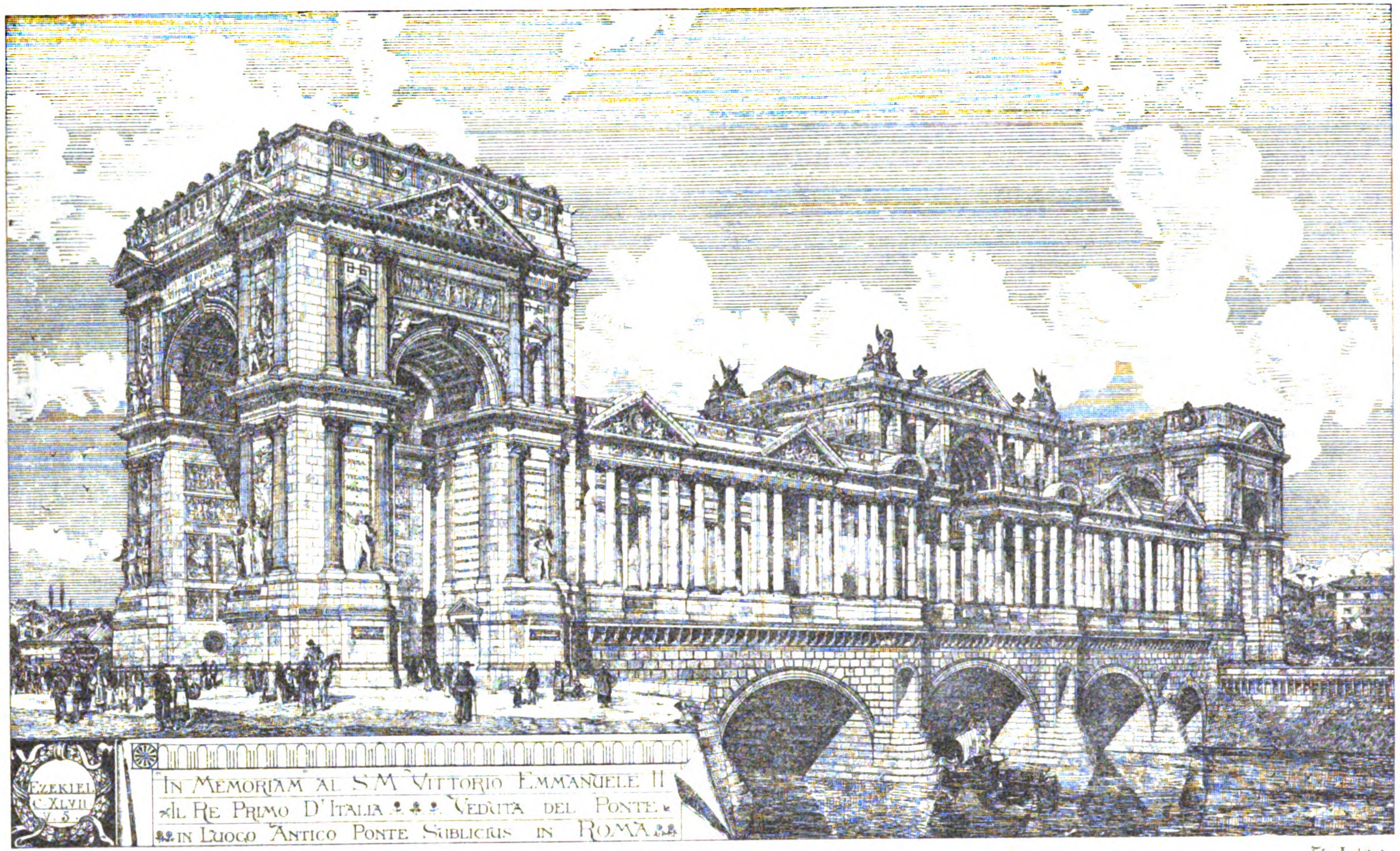
EXPOSITION
INTERNATIONALE DE NICE

1er décembre 1883. — 1er mai 1884.

Cette exposition, ouverte sous le patronage et avec le concours de la VILLE DE NICE, de l'ÉTAT, du DÉPARTEMENT DES ALPES-MARITIMES et de la CHAMBRE DE COMMERCE DE NICE, comprendra les produits de l'Agriculture, de l'Industrie et des Beaux-Arts. — S'adresser à M. le Commissaire général de l'Exposition internationale, a Nice.



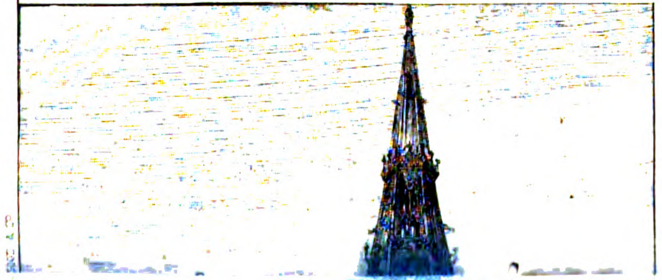
Warehouse Blackfriars St Manchester erected for Messrs Bourlem and Co F H Oldham FRIBA Architect
THE BUILDING NEWS.

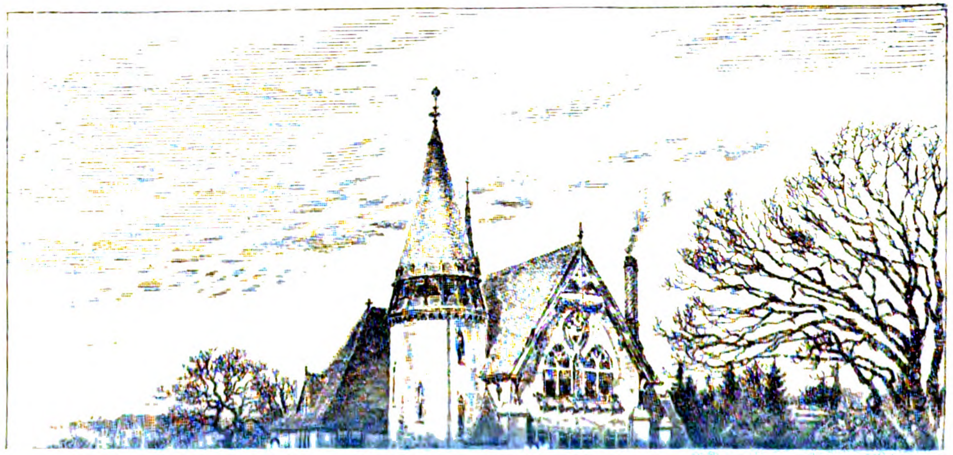


The Architect.

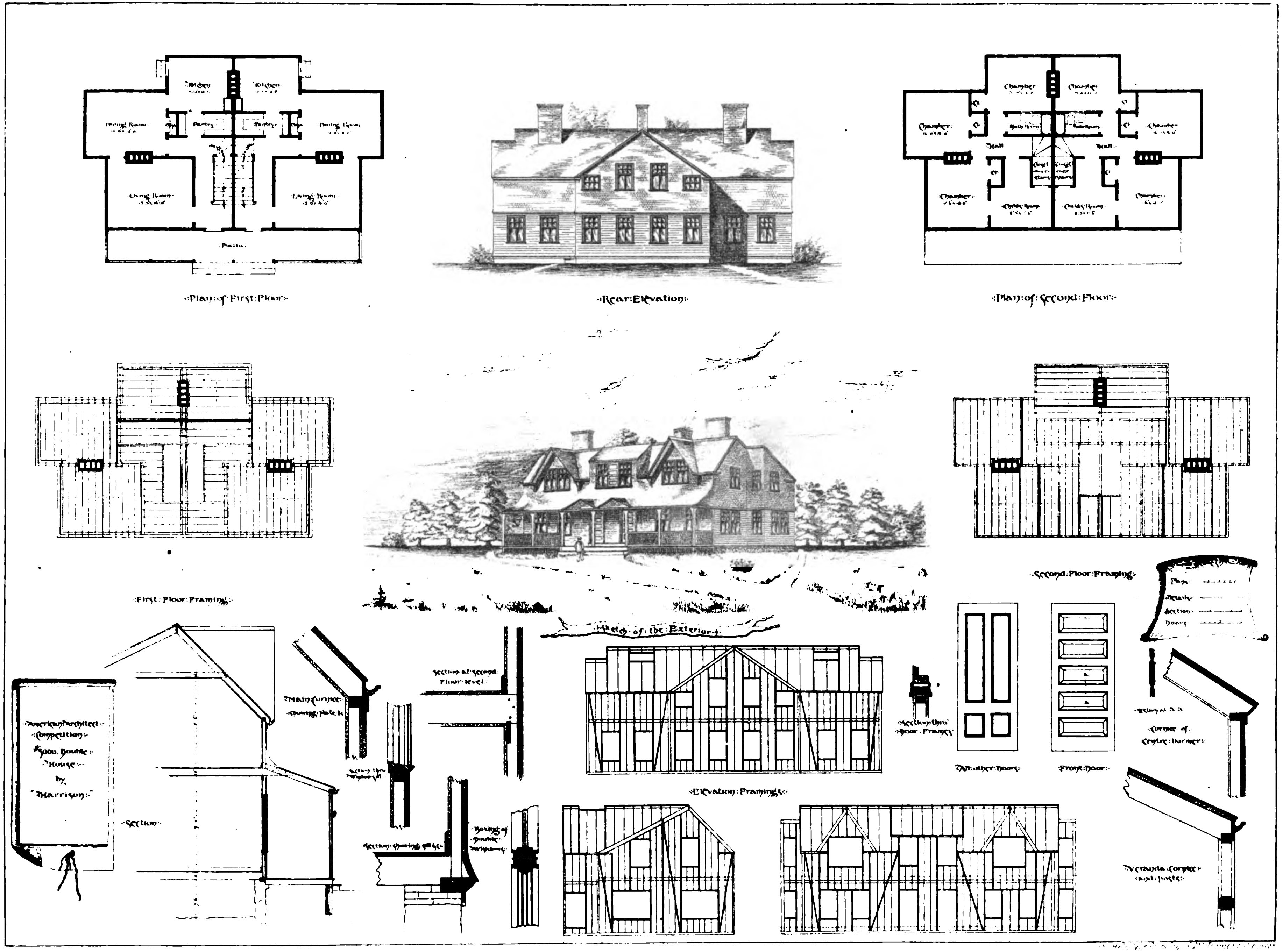
DESIGN FOR THE VICTOR EMMANUEL MEMORIAL.
[PROPOSED REBUILDING OF THE PONS SUBLICIUS, ROME.]
By DANIEL BRADE FRIBA

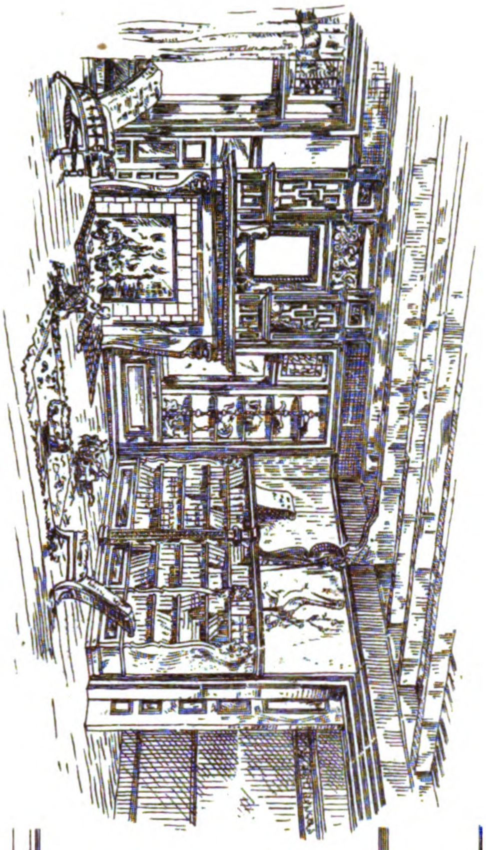
OUR FOREIGN EXCHANGES

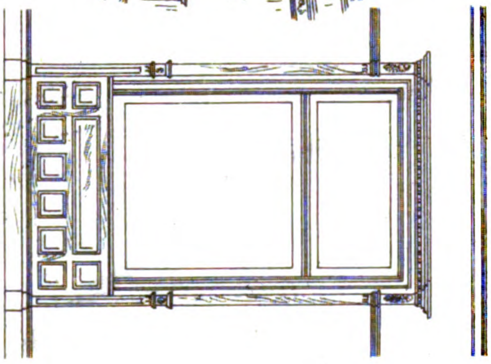


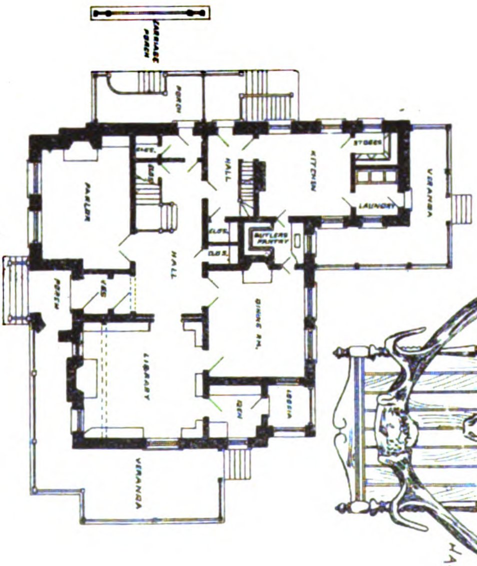


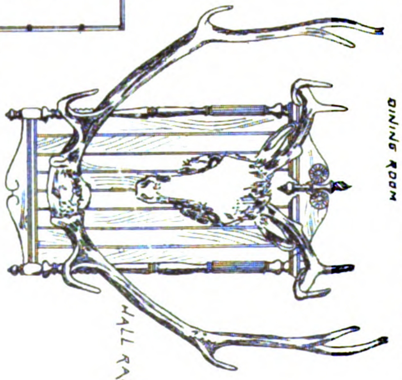
AMERICAN ARCHITECT AND BUILDING NEWS, SEPT 29 1883. No. 405

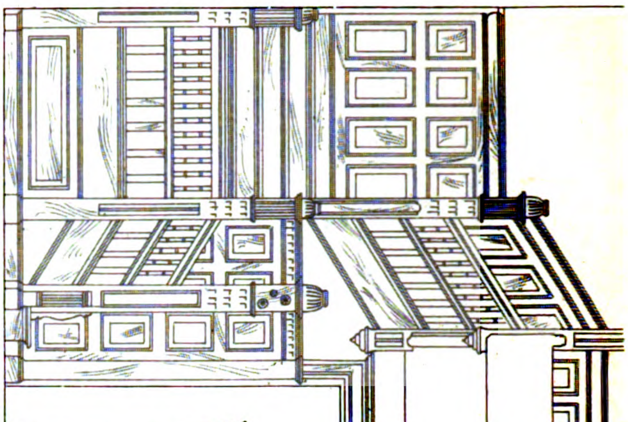


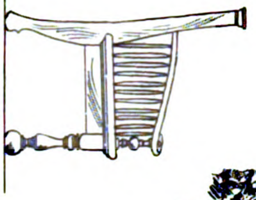

VIEW IN LIBRARY

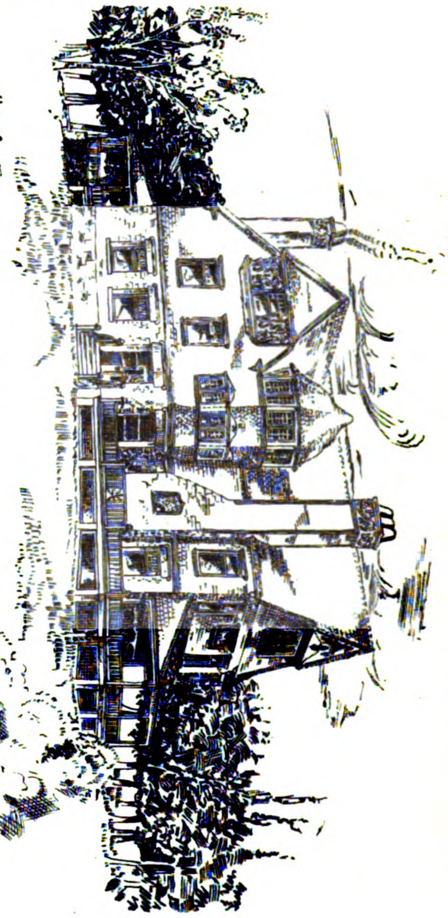

PARLOR WINDOW

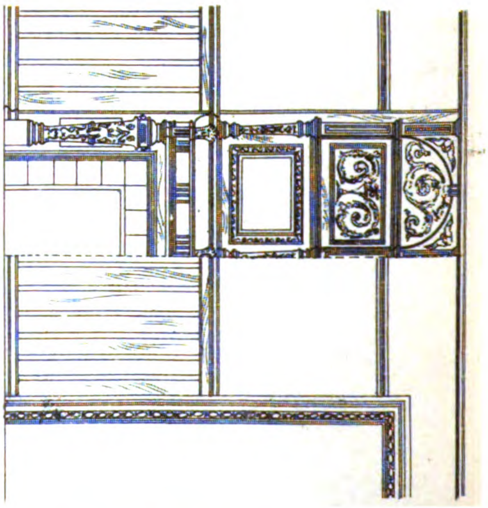

PLAN


HALL RACK

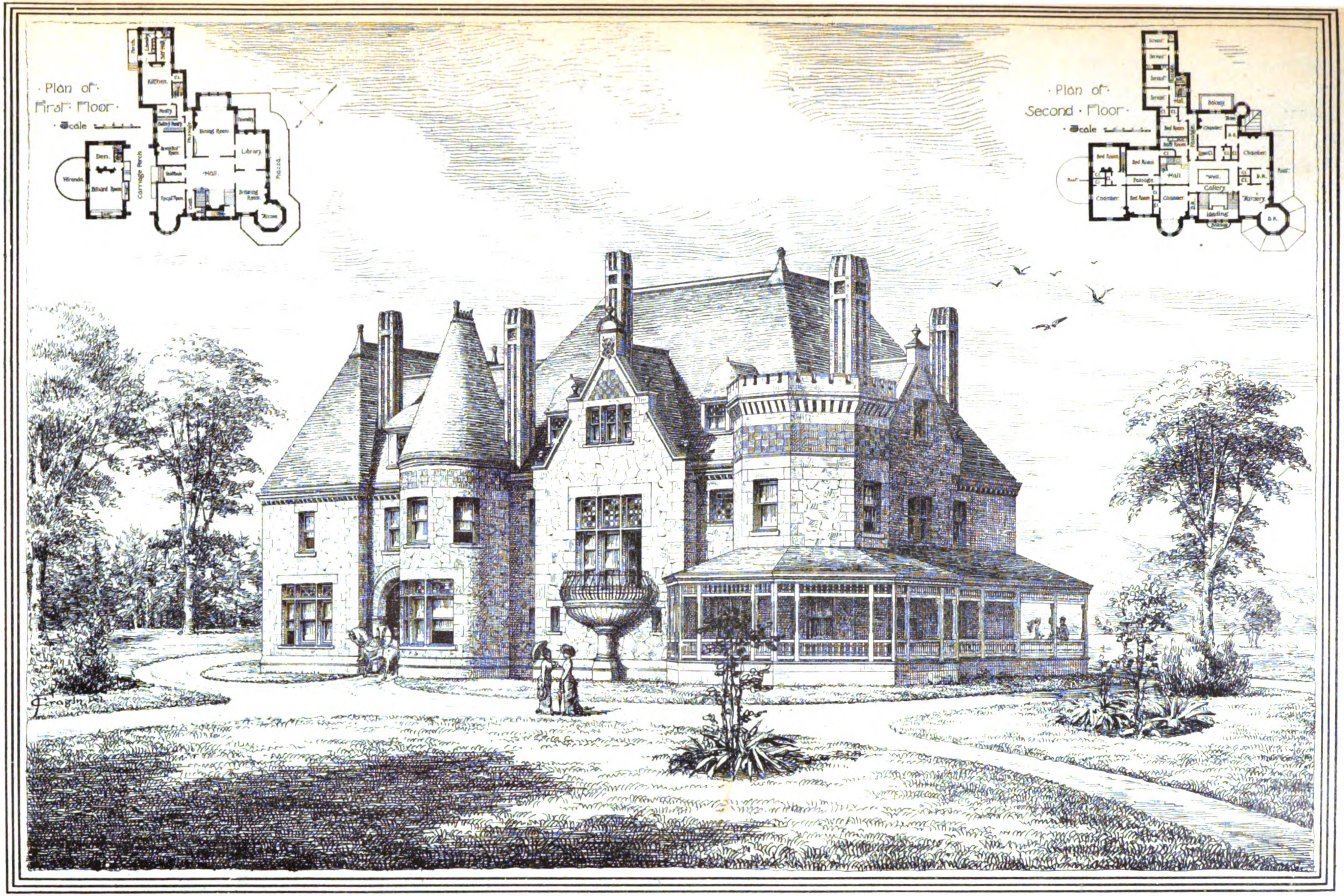

STAIRCASE


SEAT


House for W. Dudley Foulke Esq.
Richmond Ind.
Green & Wicks Archts.
Auburn N.Y.


DINING ROOM

The Heliotype Printing Co 211 Tremont St. Boston.



The Heliotype Printing Co 211 Tremont St Boston

RICHMOND HILL

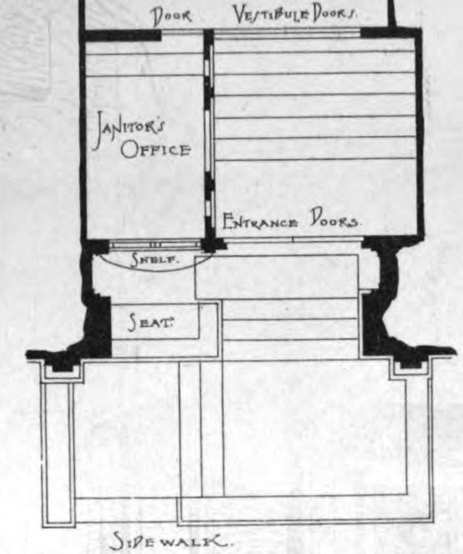
· ARTHUR · HOOPER · DODD ·· ARCHT ·
· RIALTO · BUILDING · BOSTON ·

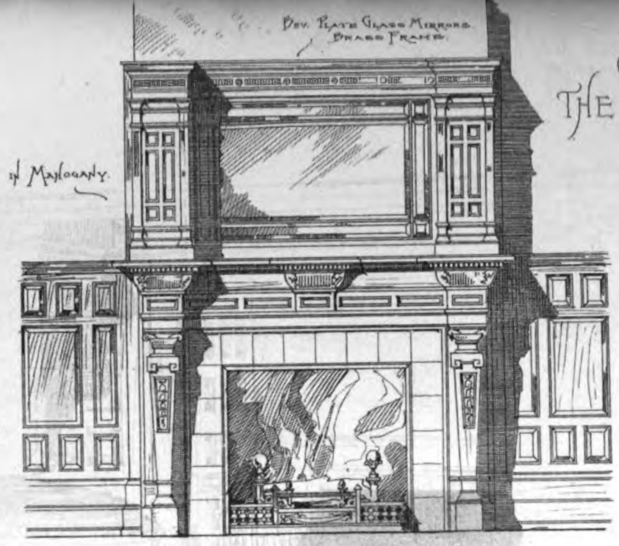
BITS FROM THE "BERKSHIRE"

N.W. COR. 52D ST.
AND MADISON AVE.
NEW YORK.

MR. CARL PFEIFFER,
ARCHITECT.

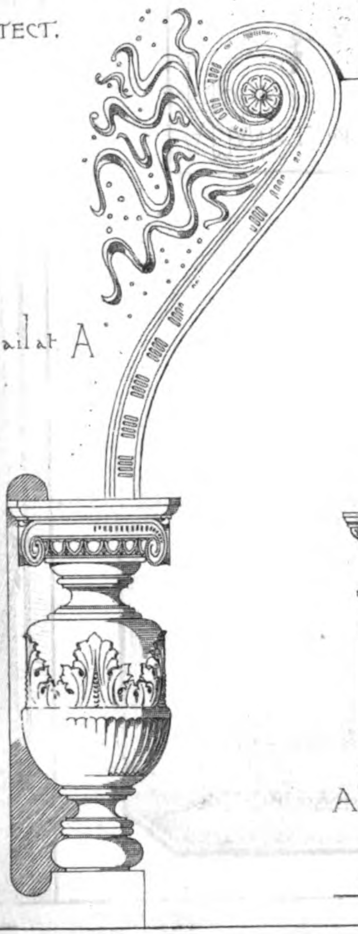
PLAN OF MAIN ENTRANCE.





MANTEL IN DINING ROOM — SECOND FLOOR.

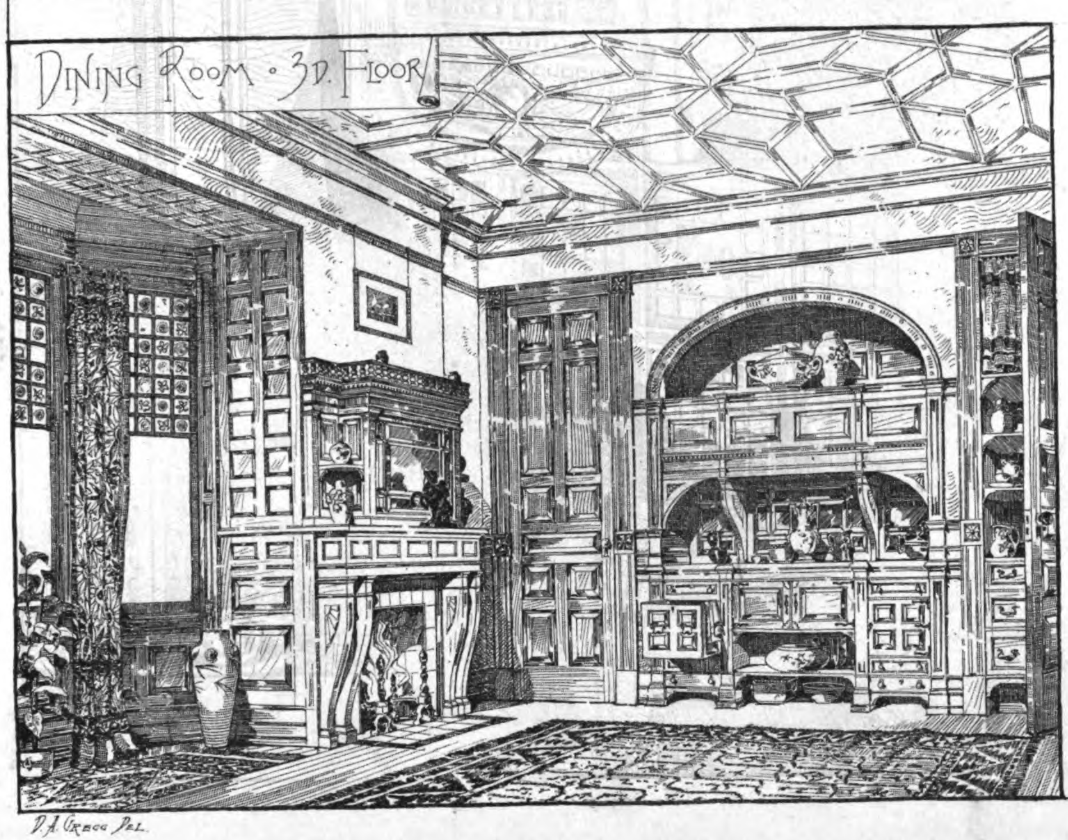
DETAIL AT B.



DETAIL AT A.

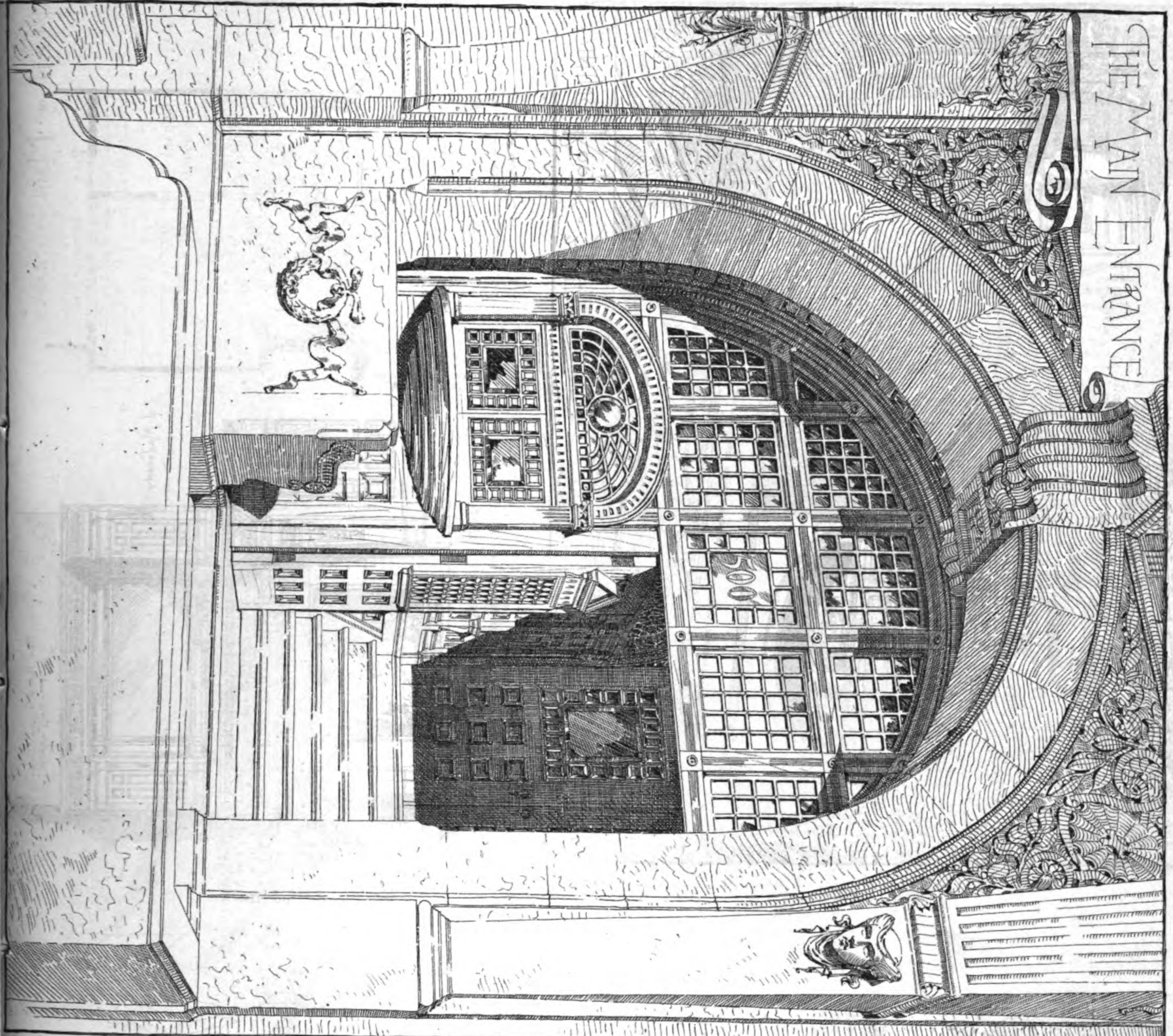
MANTEL IN ENTRANCE HALL.

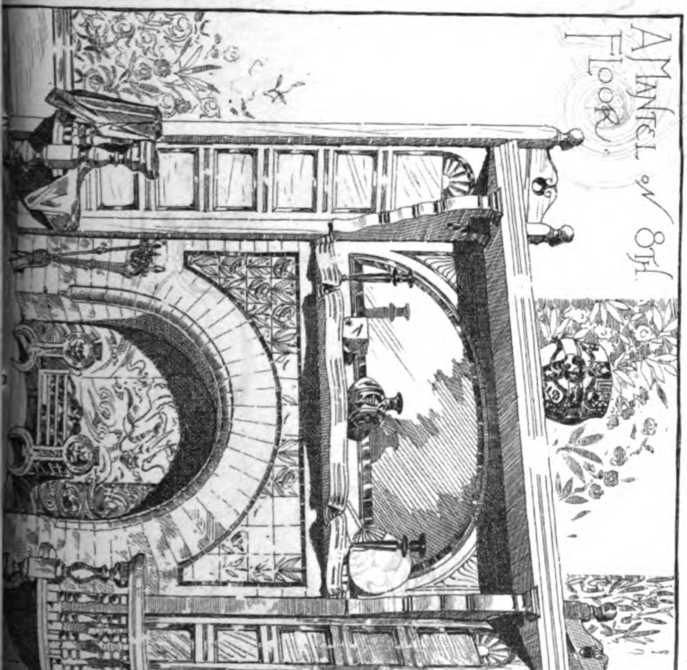
DINING ROOM · 3D. FLOOR.

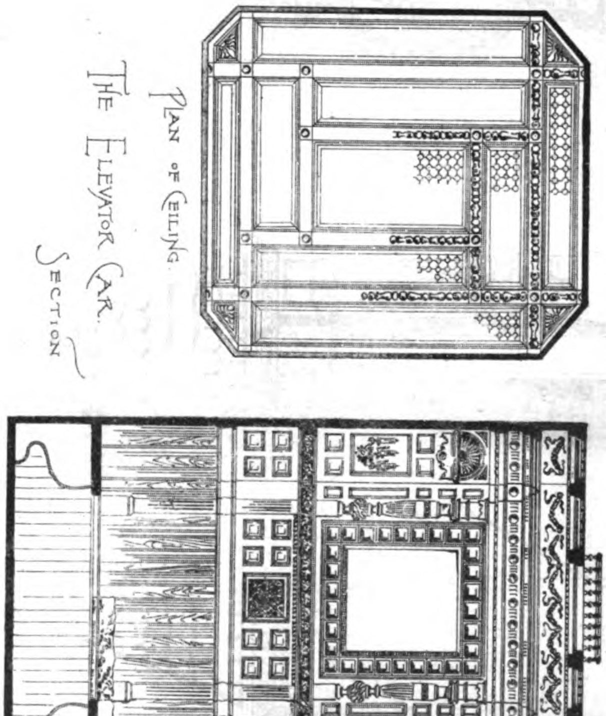


D. A. GREGG DEL.

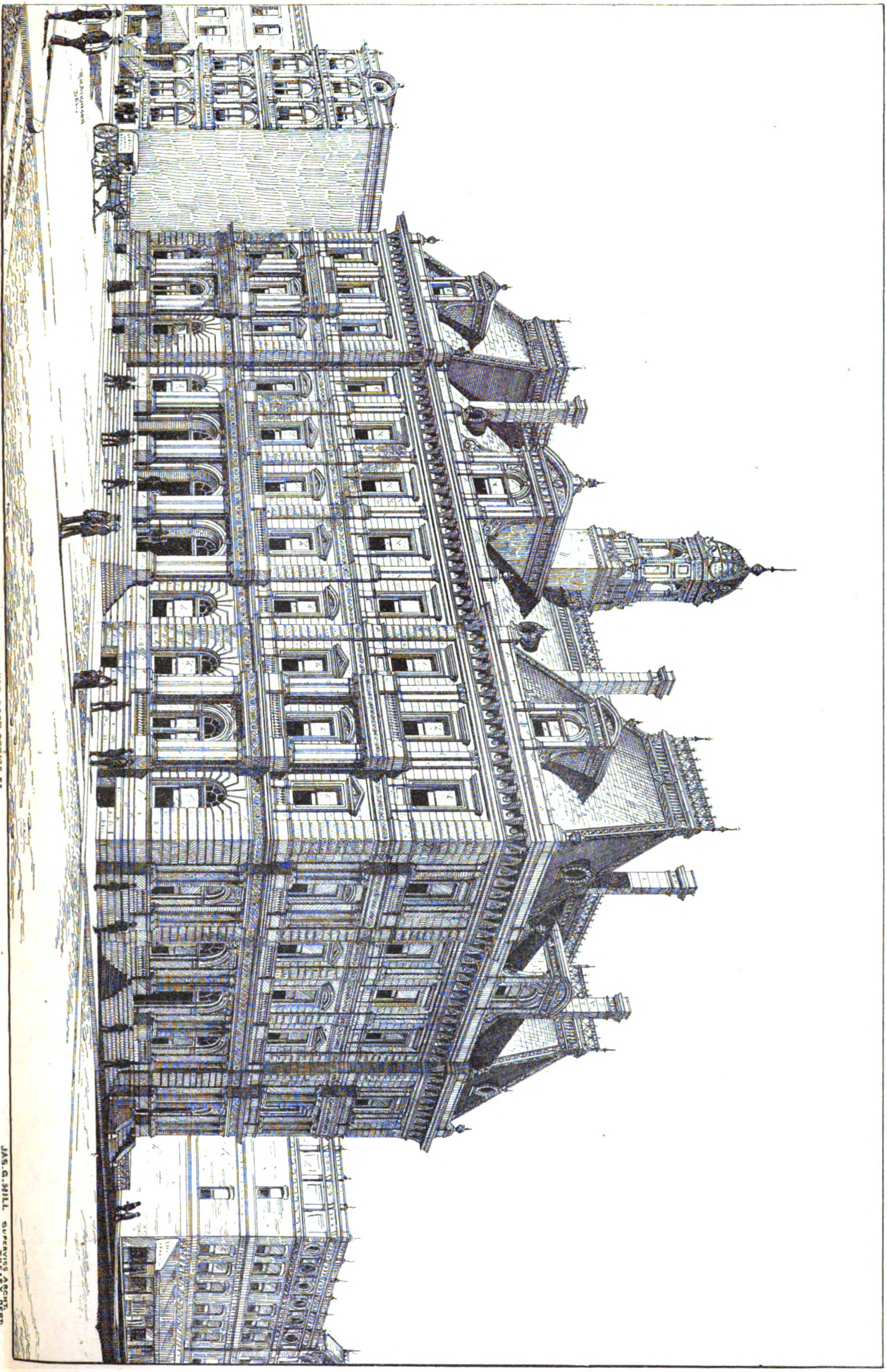
The Heliotype Printing Co. 211 Tremont St. Boston.


THE MAIN ENTRANCE
500


A MANTEL ON 8TH FLOOR


PLAN OF CEILING
THE ELEVATOR CAR
SECTION

AMERICAN ARCHITECT AND BUILDING NEWS, OCT. 6 1883. No. 406

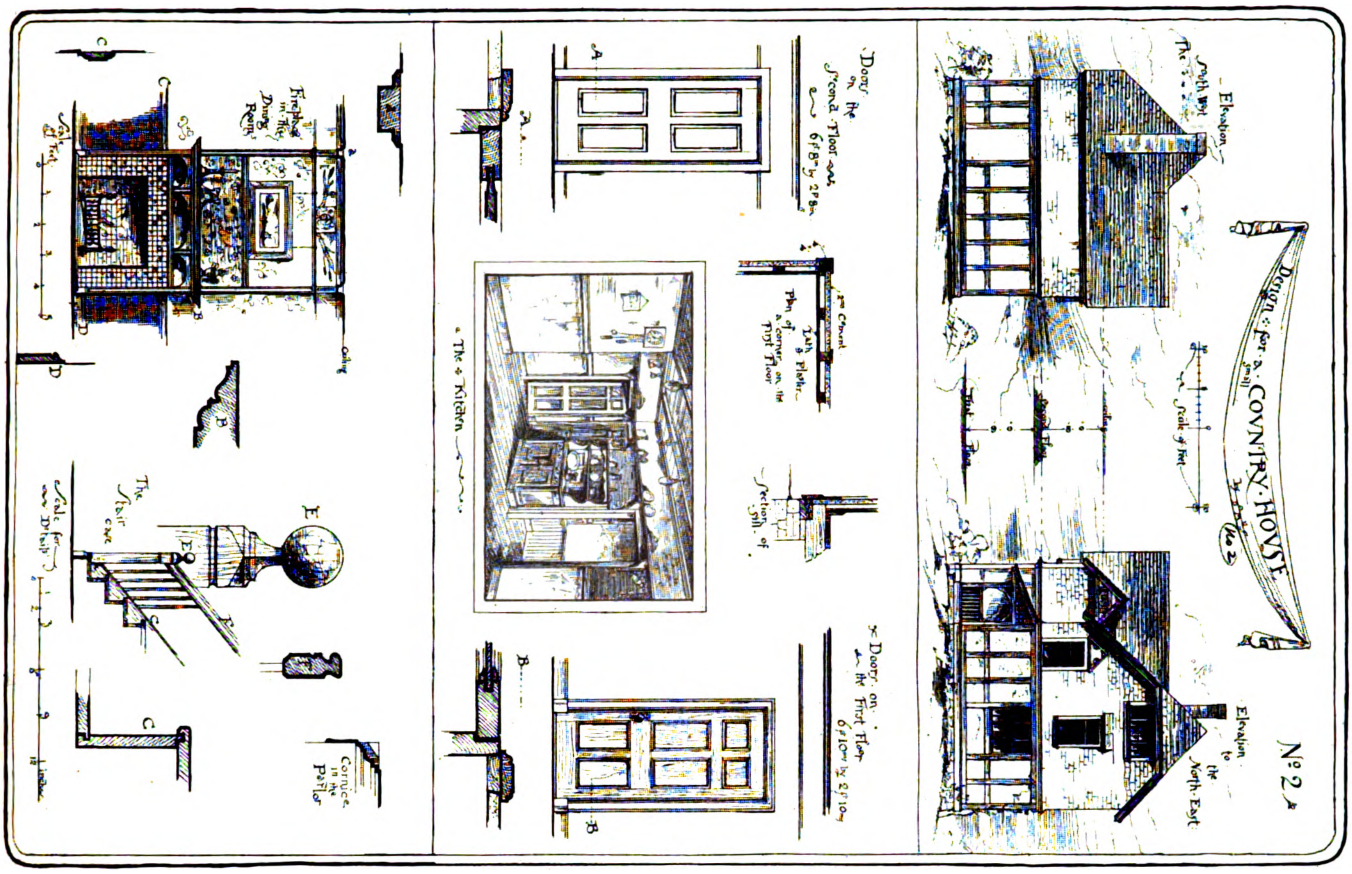


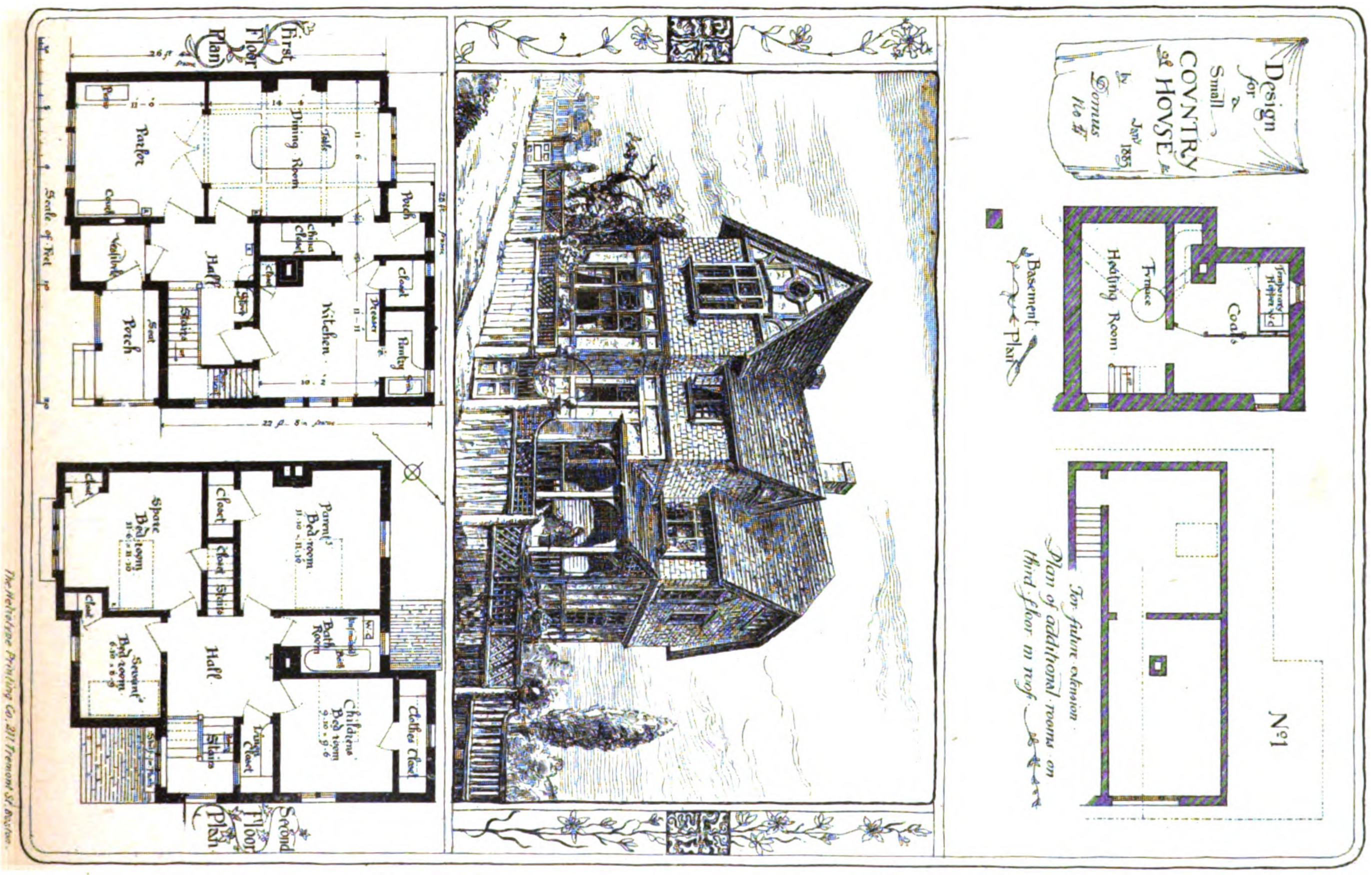
U.S. COURT-HOUSE, POST-OFFICE &c.
DETROIT MICH.

JAS. G. HILL SUPERVIS'G ARCHT.
TREAS'Y DEP'T

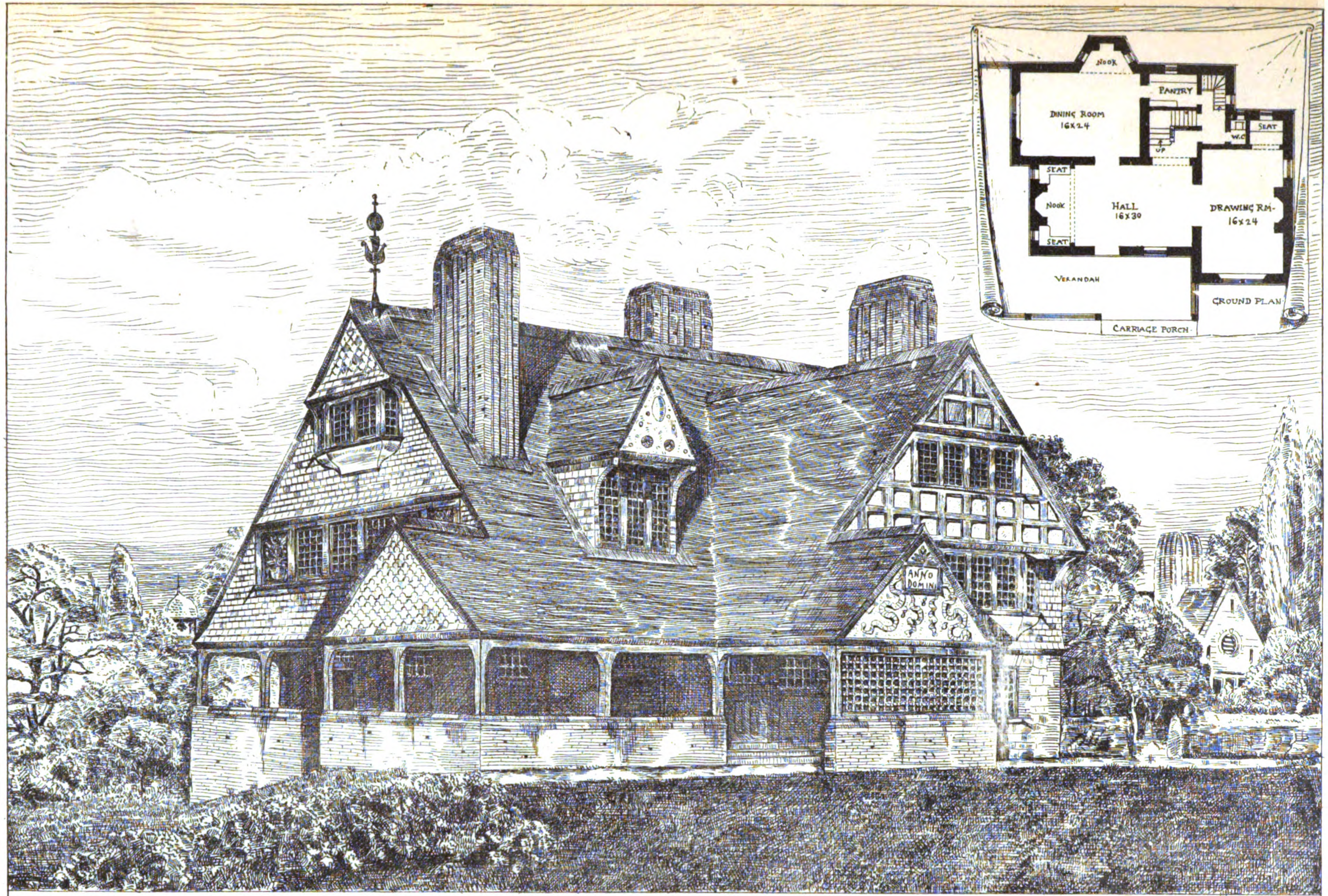
The Heliotype Printing Co. 211 Tremont St. Boston.

AMERICAN ARCHITECT AND BUILDING NEWS, OCT. 6 1883. No. 406





No. 407 American Architect and Building News, Oct. 13. 1883.

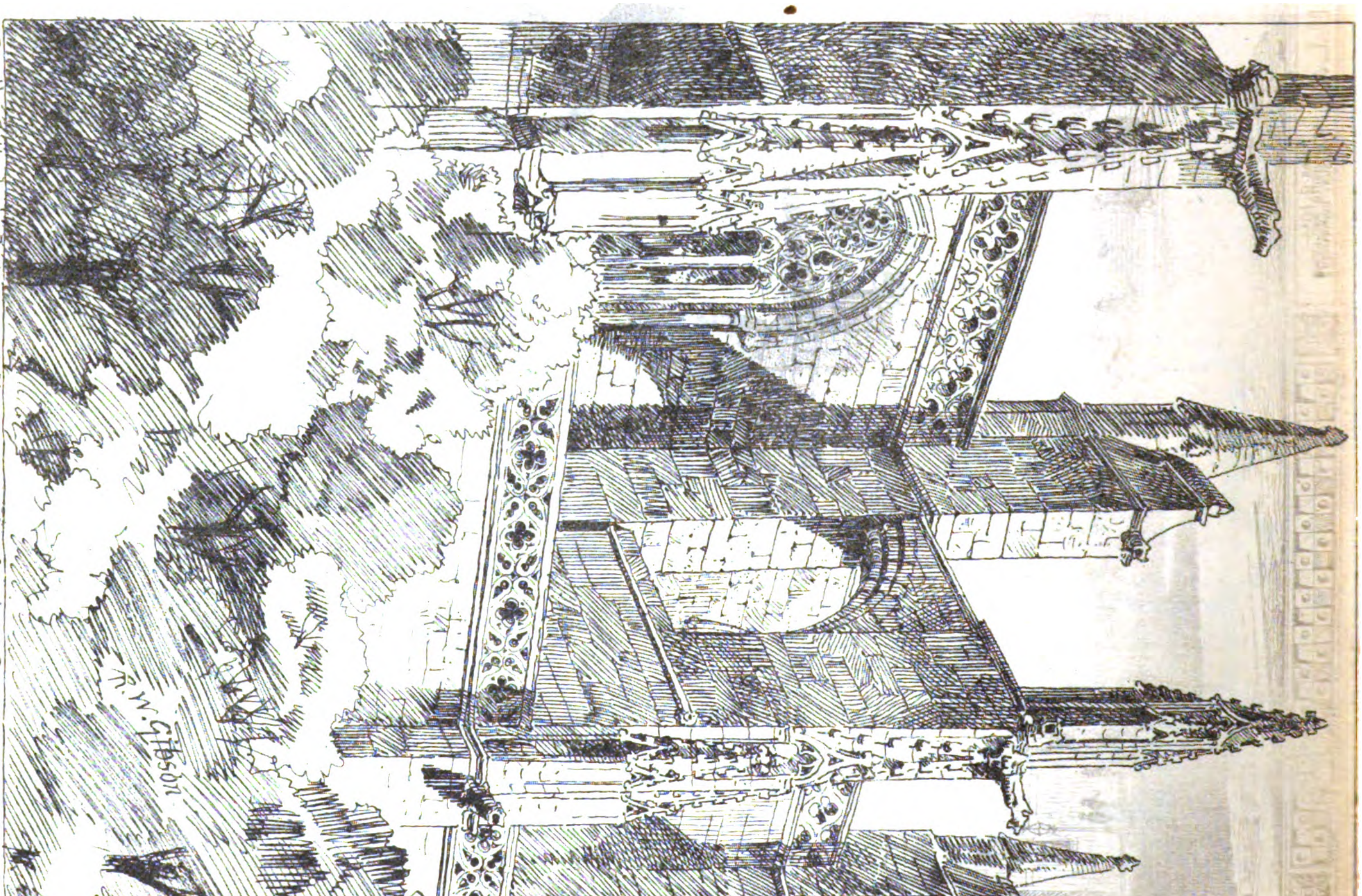


A COUNTRY HOUSE WM. A. BATES ARCH'T. 149 B'WAY. NEW YORK

The Heliotype Printing Co. 211 Tremont St. Boston

No. 407 American Architect and Building News. Oct. 13 1883.

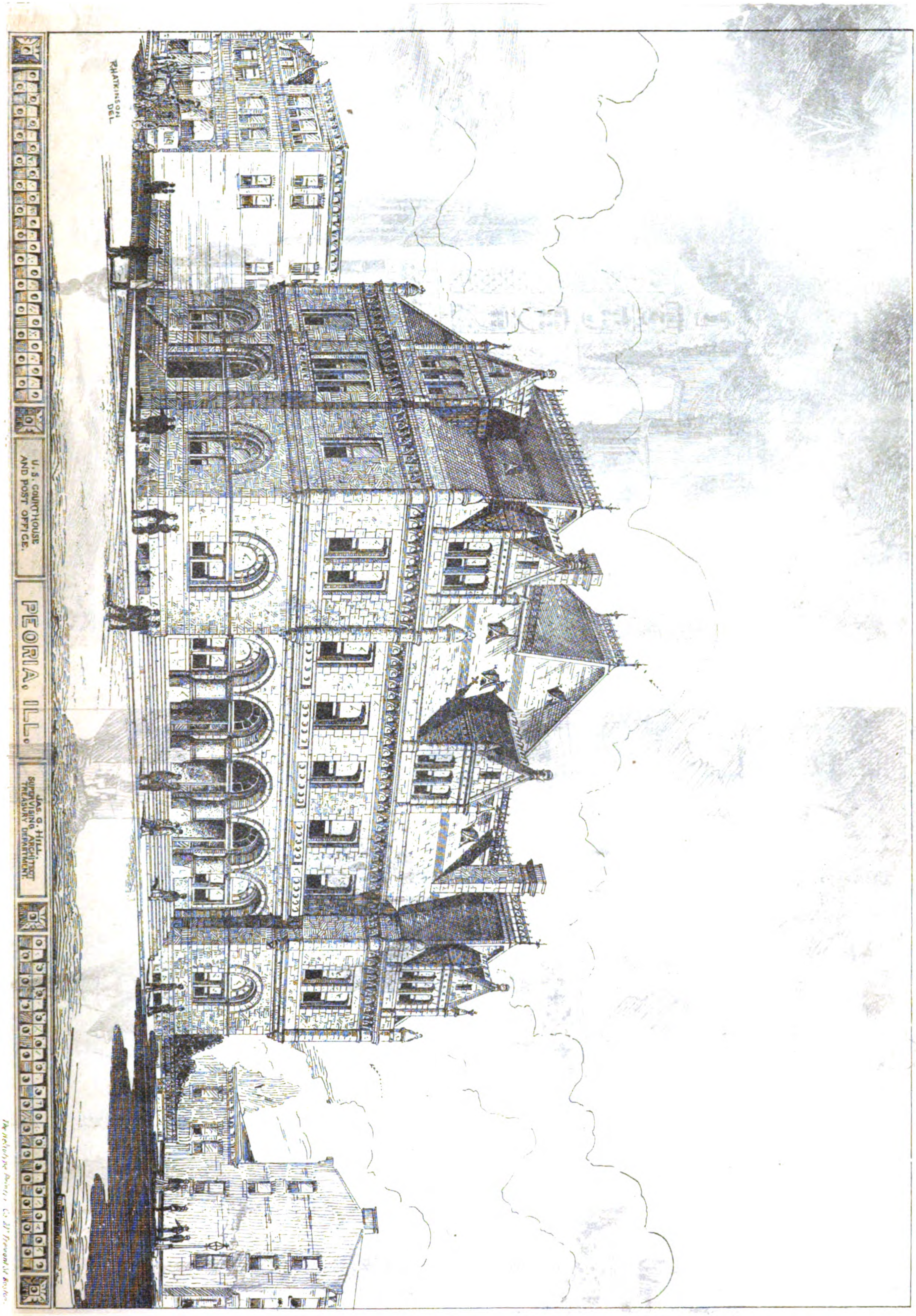
La Giralda - Seville



Seville Cathedral. Buttresses of Nave. from the Court of Oranges

The Heliotype Printing Co. Boston.

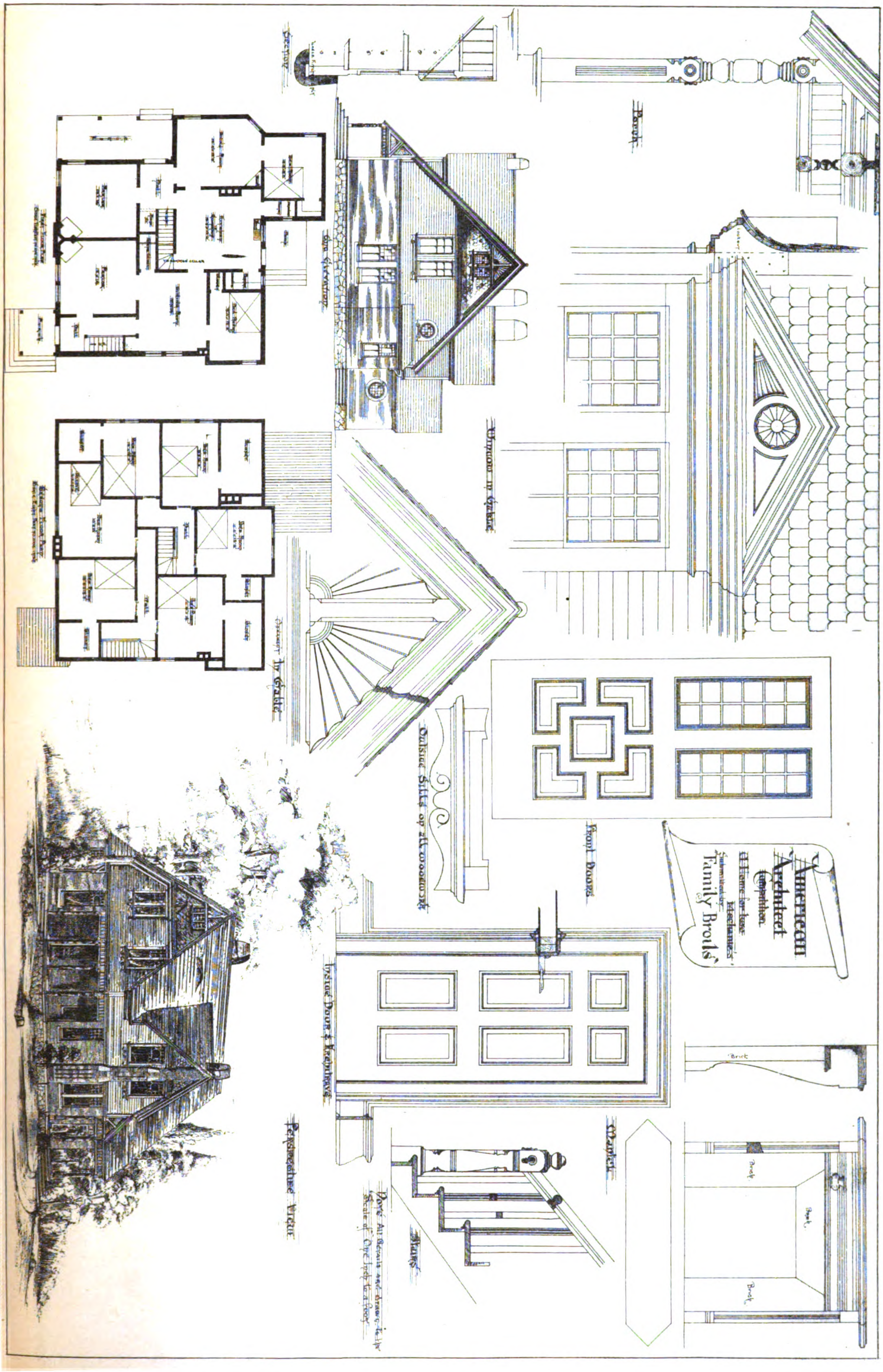
AMERICAN ARCHITECT AND BUILDING NEWS, OCT. 13. 1883. No. 407



U. S. COURTHOUSE AND POST OFFICE.

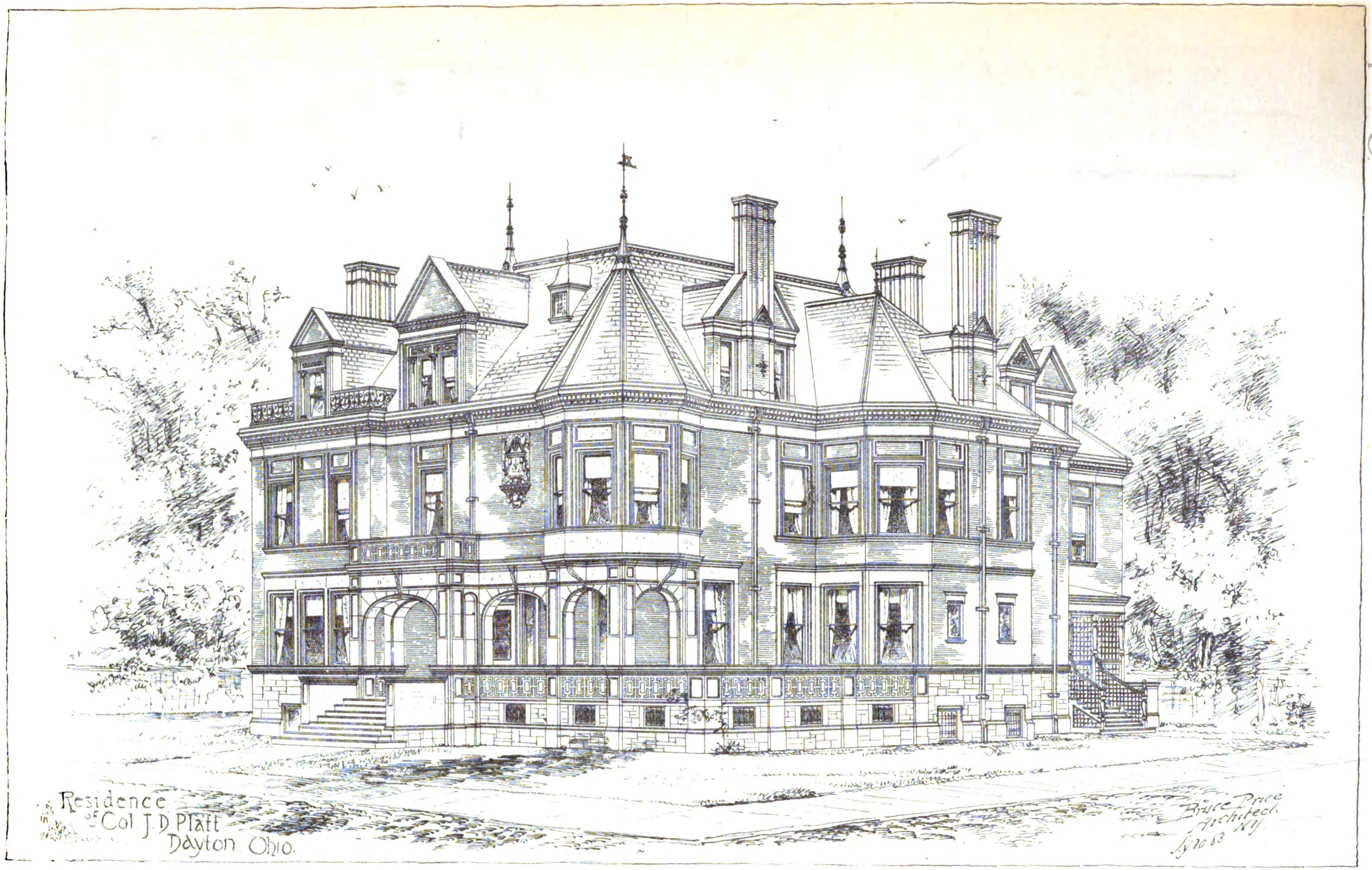
PEORIA, ILL.

JAS. G. HILL. SUPERVISING ARCHITECT TREASURY DEPARTMENT.



The Heliotype Printing Co. 211 Tremont St. Boston

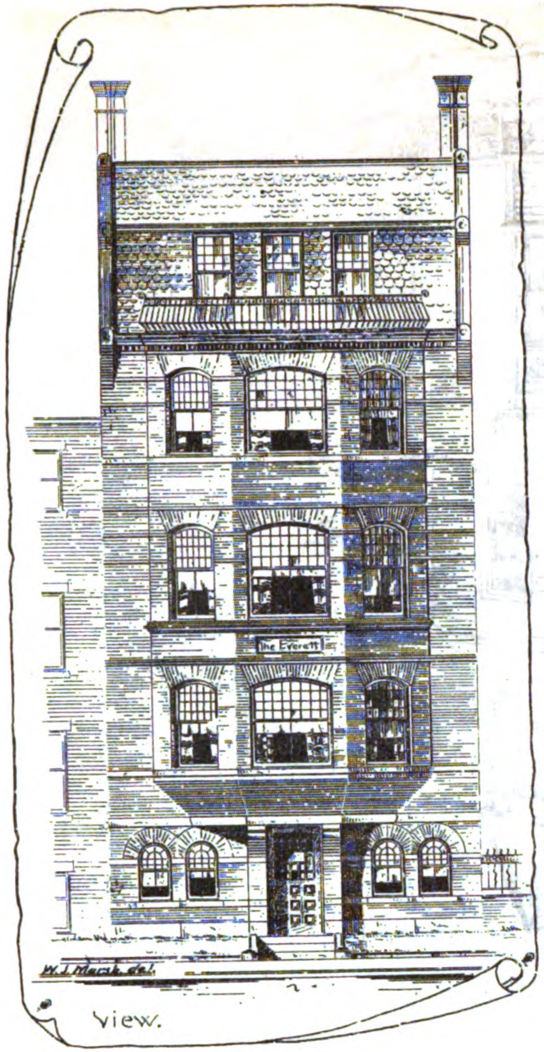
No. 408 American Architect and Building News, Oct. 20 1883.

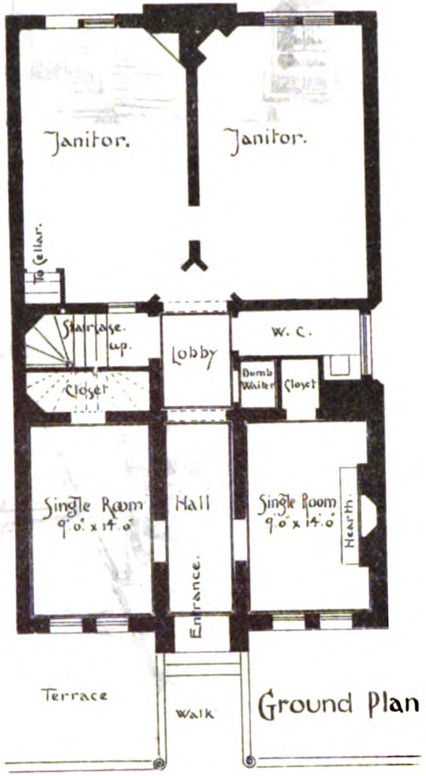


The Heliotype Printing Co. 211 Tremont St. Boston.

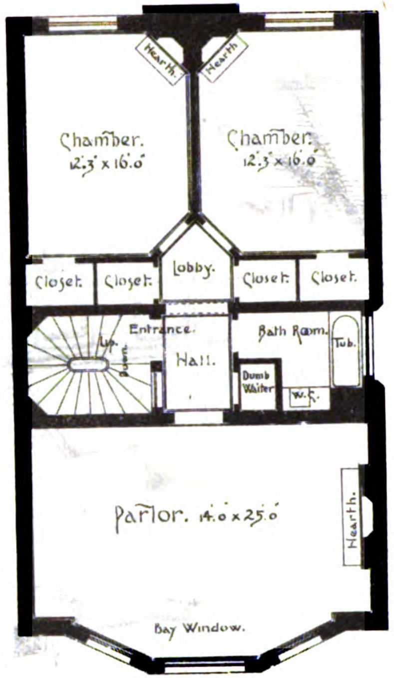
"The Everett" ✻

Bachelor Apartments ··· 1730 "H" Street N.W.
Washington · D·C·

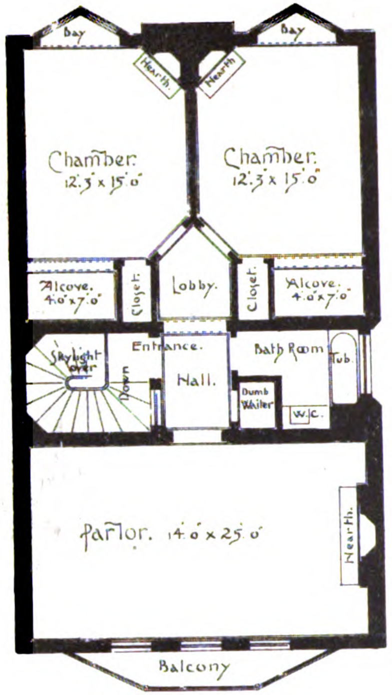




Ground Plan.



Plan of 1st, 2nd & 3rd Stories.



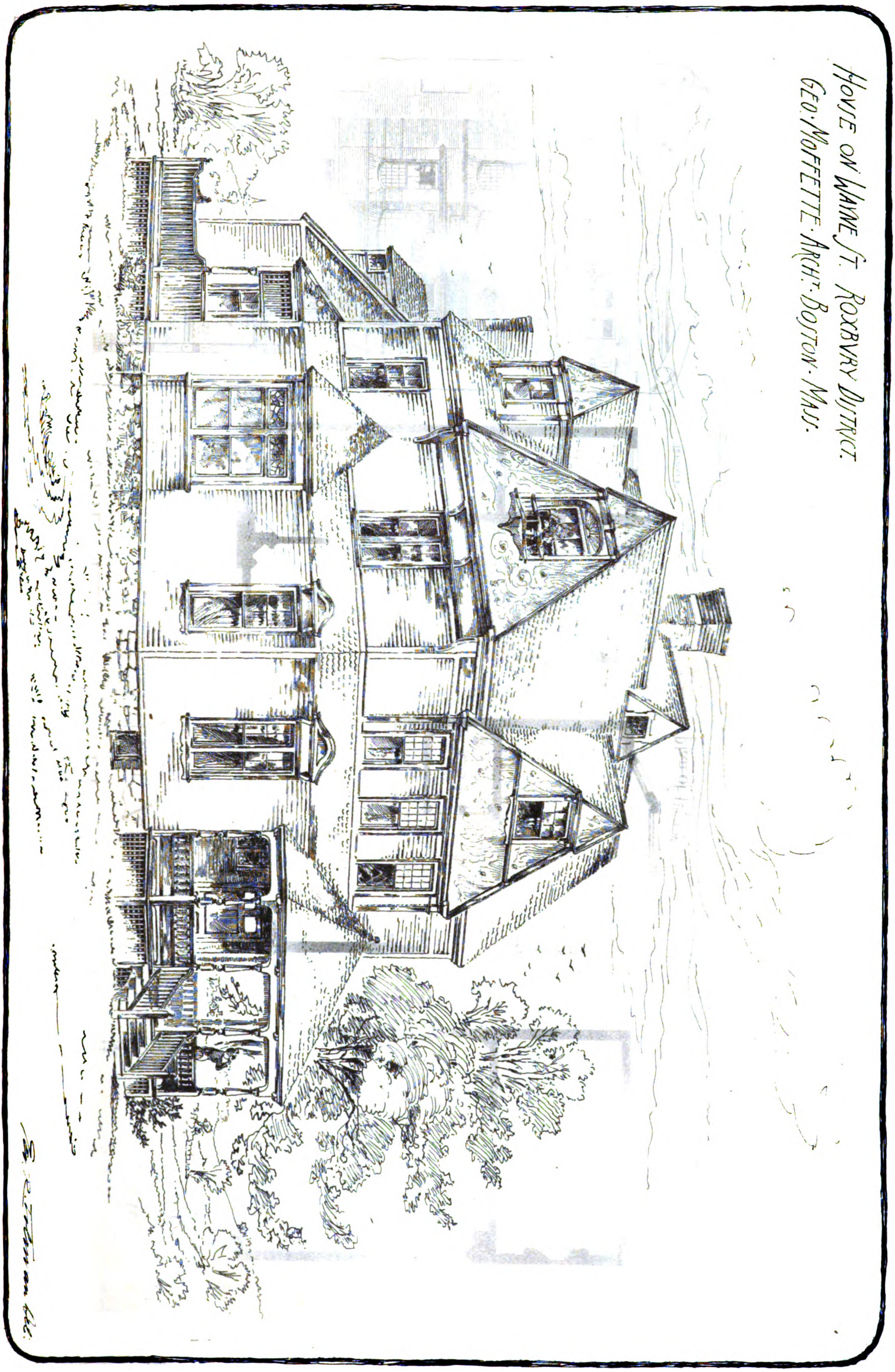
Plan of 4th Story.

Jos. C. Hornblower Archt.
Washington D·C·

1883.

The Heliotype Printing Co. 211 Tremont St. Boston

AMERICAN ARCHITECT AND BUILDING NEWS, OCT. 20 1883. No. 408



HOUSE ON WAYNE ST. ROXBURY DISTRICT.
GEO. MOFFETTE. ARCHT. BOSTON. MASS.

E. R. Tilton del.

The Heliotype Printing Co. 211 Tremont St. Boston

AMERICAN ARCHITECT AND BUILDING NEWS. OCT. 20 1883. No. 408
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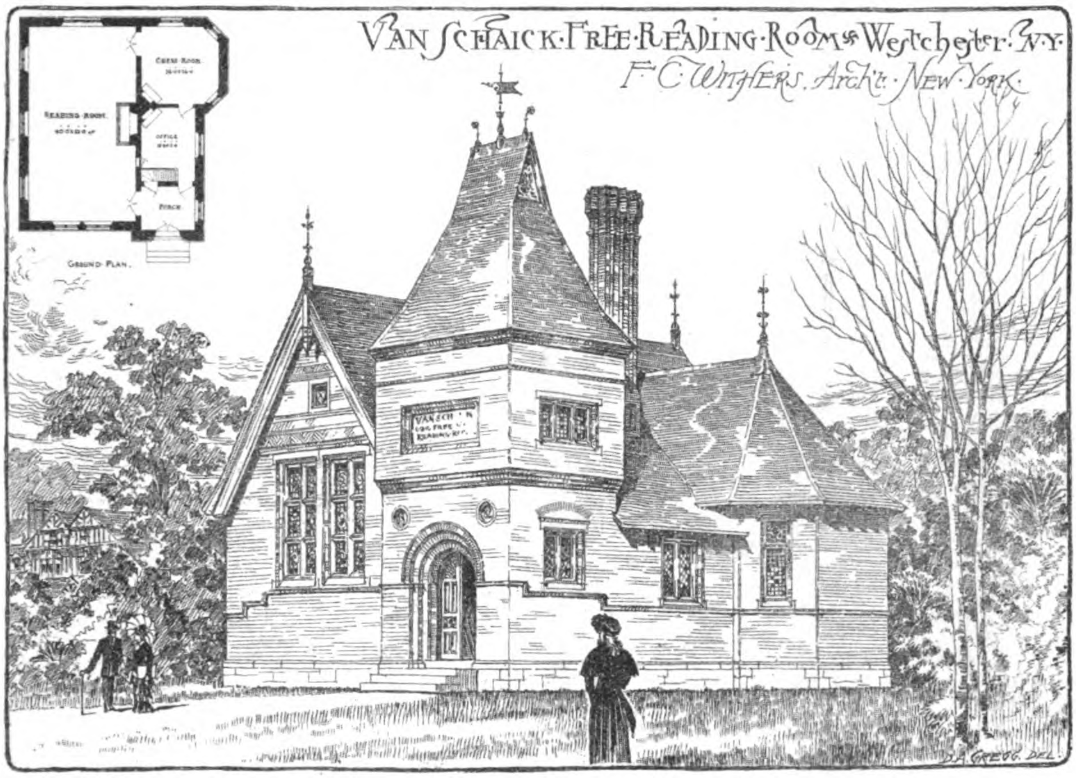
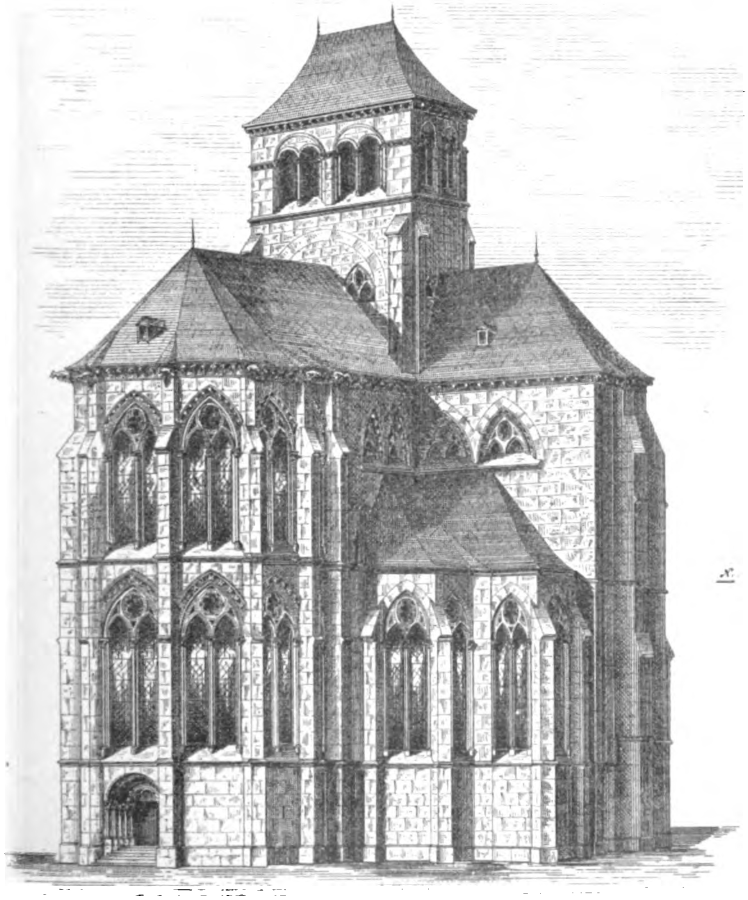
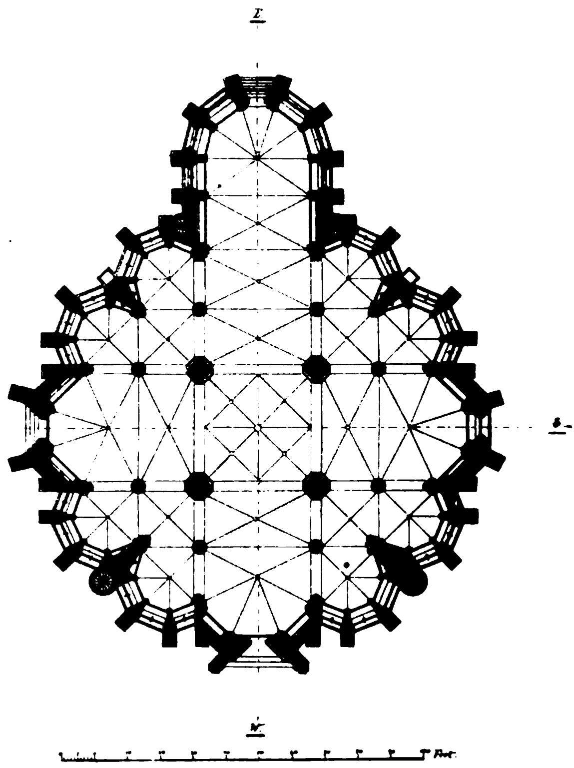


MONUMENT ON THE RHINE.
Liebfrauen Kirche zu TRIER. 1227–1243.

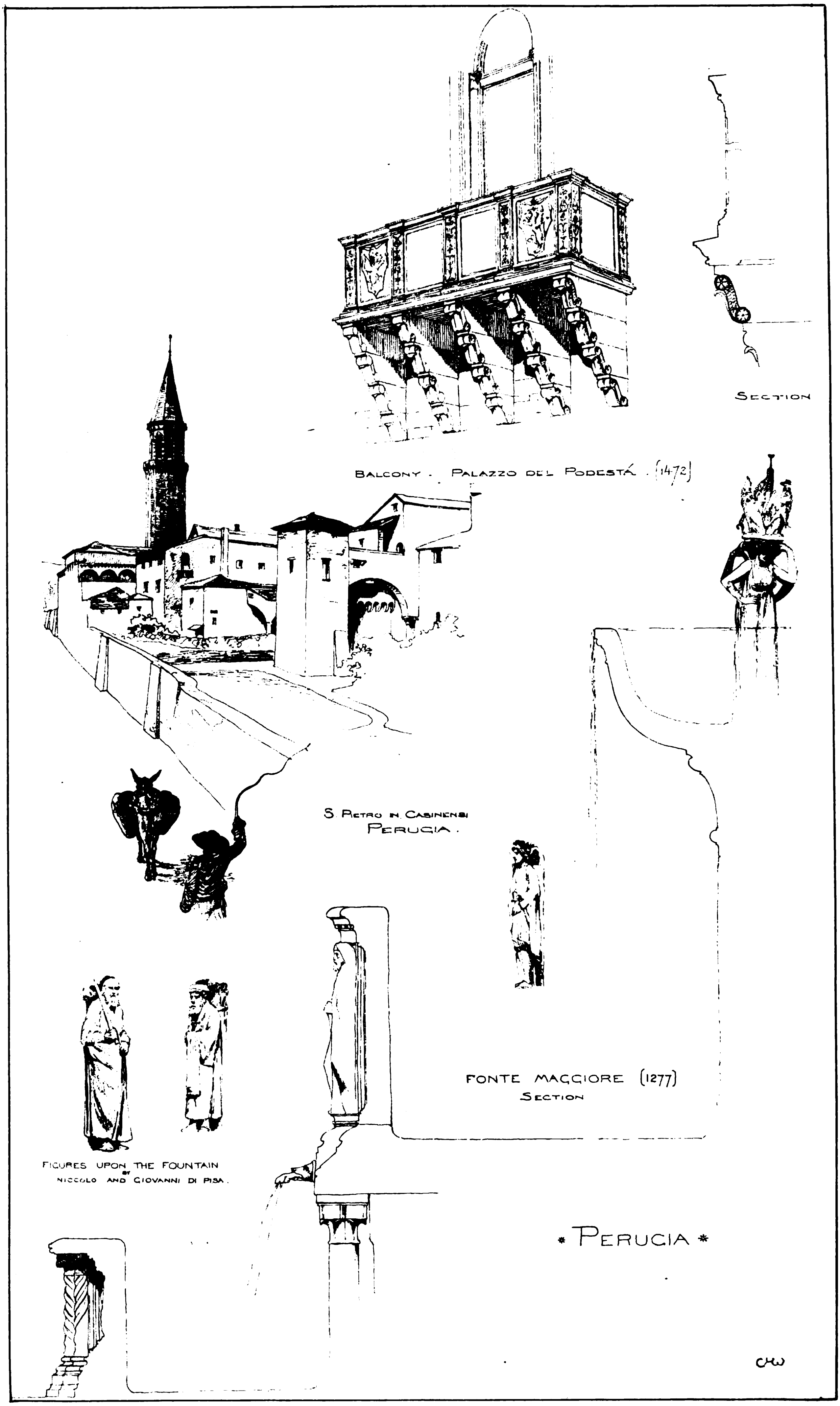


Perspective View from the East side.



Ground Plan.

Frank Zimmermann. Drg.



BALCONY. PALAZZO DEL PODESTÁ. (1472)

SECTION

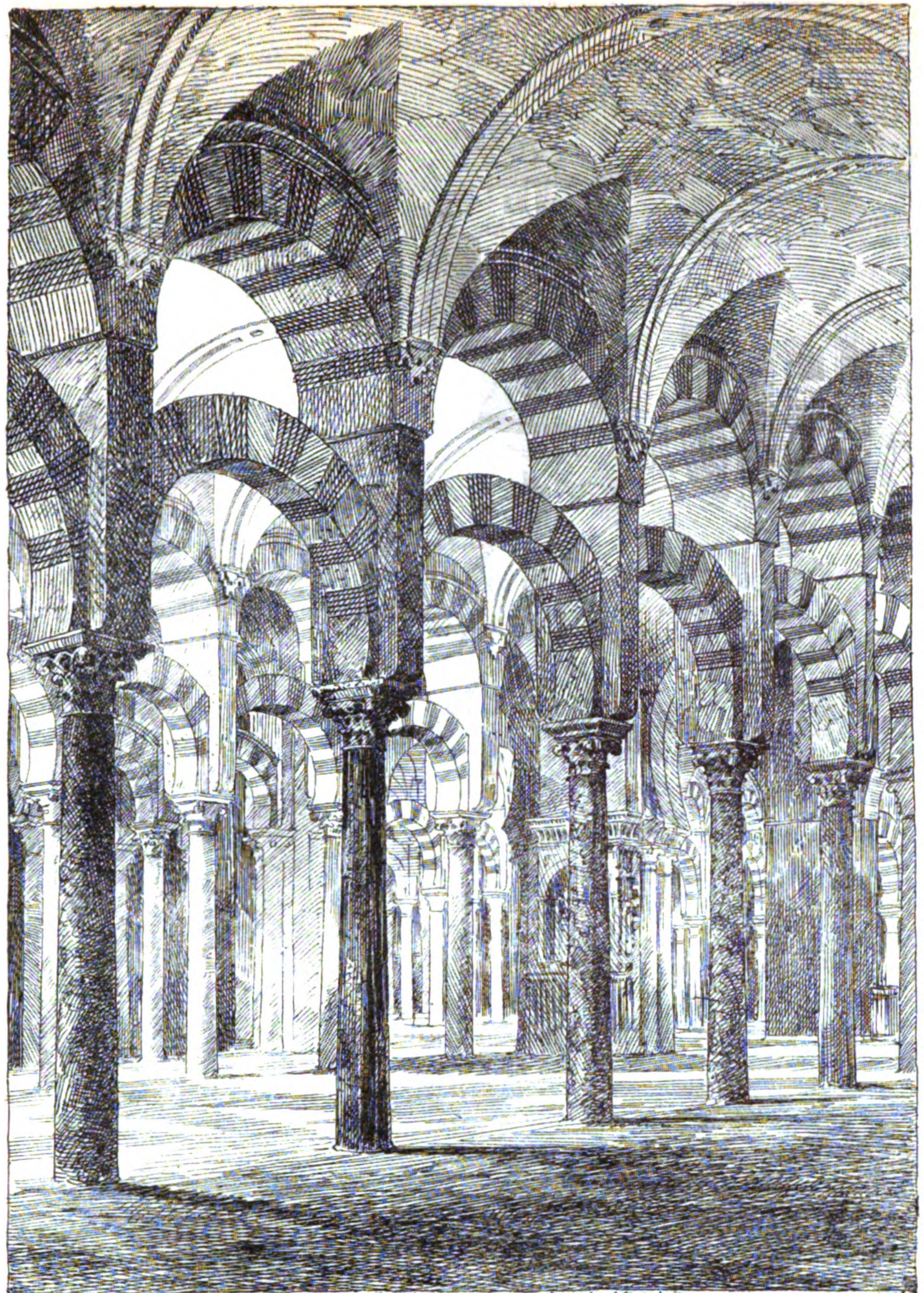
S. PIETRO IN CASINENSI
PERUGIA.

FONTE MAGGIORE (1277)
SECTION

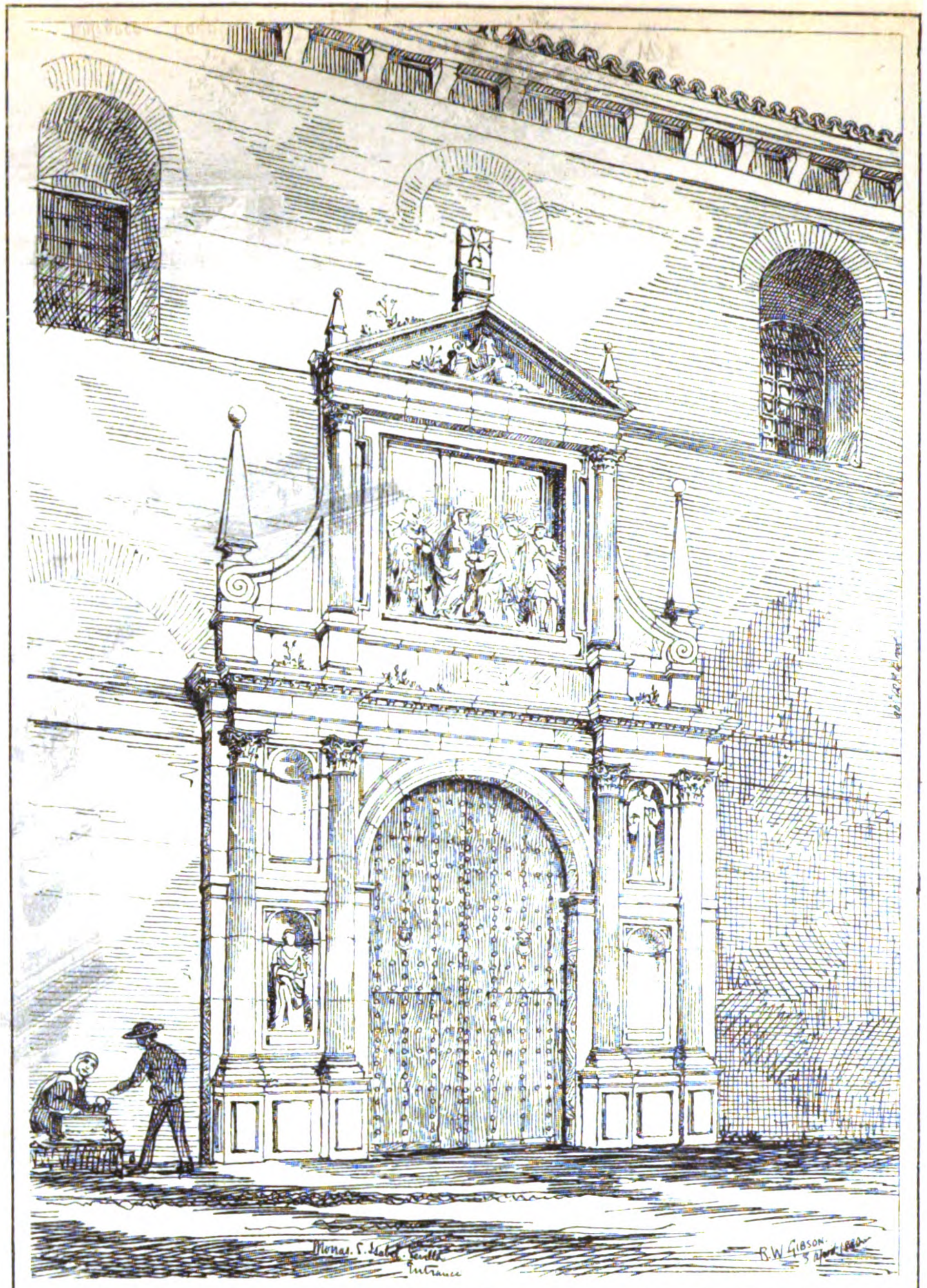
FIGURES UPON THE FOUNTAIN
BY
NICCOLO AND GIOVANNI DI PISA.

* PERUGIA *

CHW



The Mosque at Cordova = now Cordoba Cathedral = Robert W Gibson. April 1880



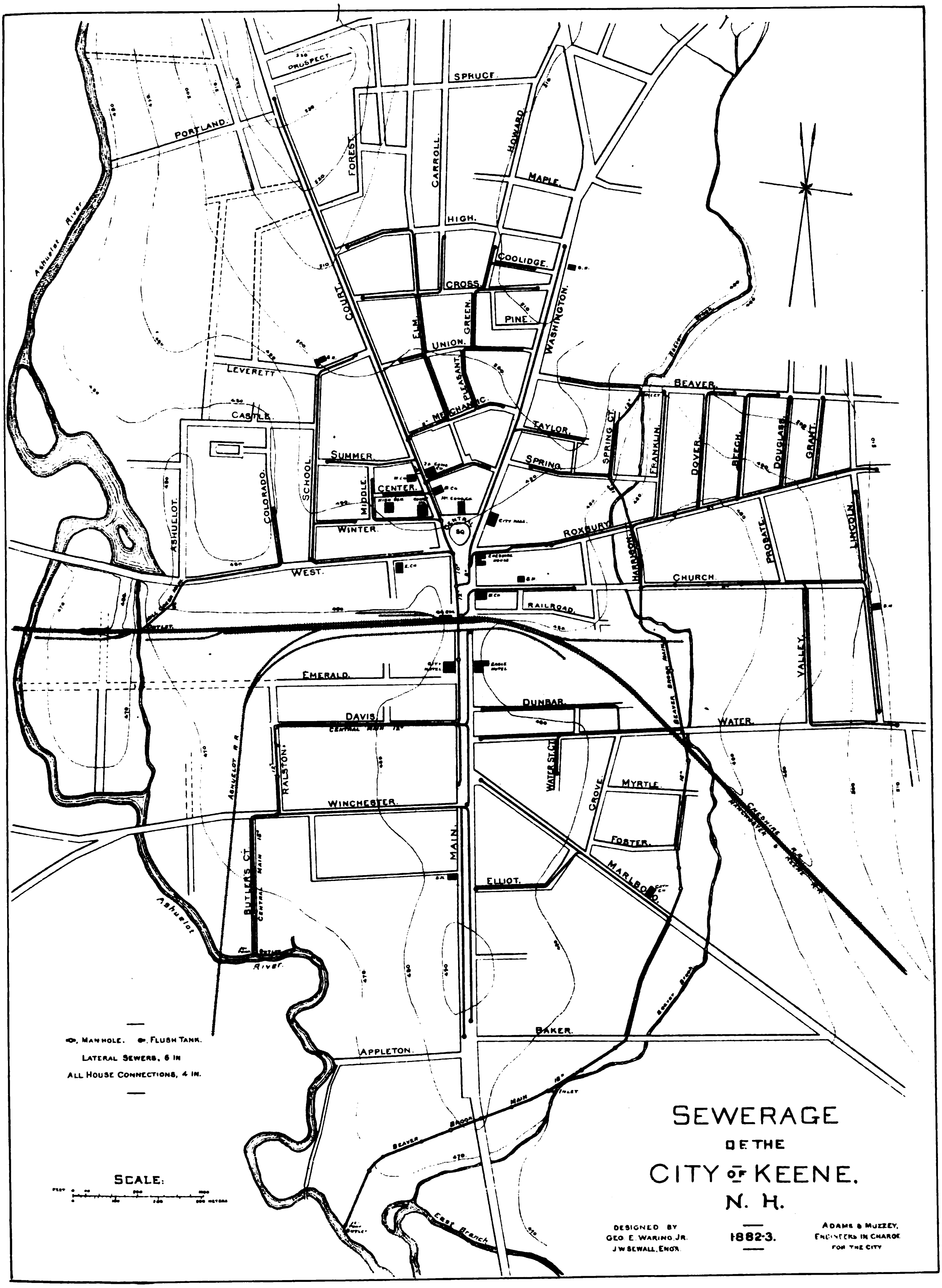
Entrance to the Monastery S. Isabel, Seville, Spain

The Heliotype Printing Co. 211 Tremont St. Boston.

* Billings Hall. *

UNIVERSITY OF VERMONT.

Competitive
Design submitted by Rossiter & Wright Architects.



⟴, Manhole. ⟴. Flush Tank.

Lateral Sewers, 6 in

All House Connections, 4 in.

Scale:

SEWERAGE
OF THE
CITY OF KEENE,
N. H.

Designed by
Geo. E. Waring, Jr.
J. W. Sewall, Engr.

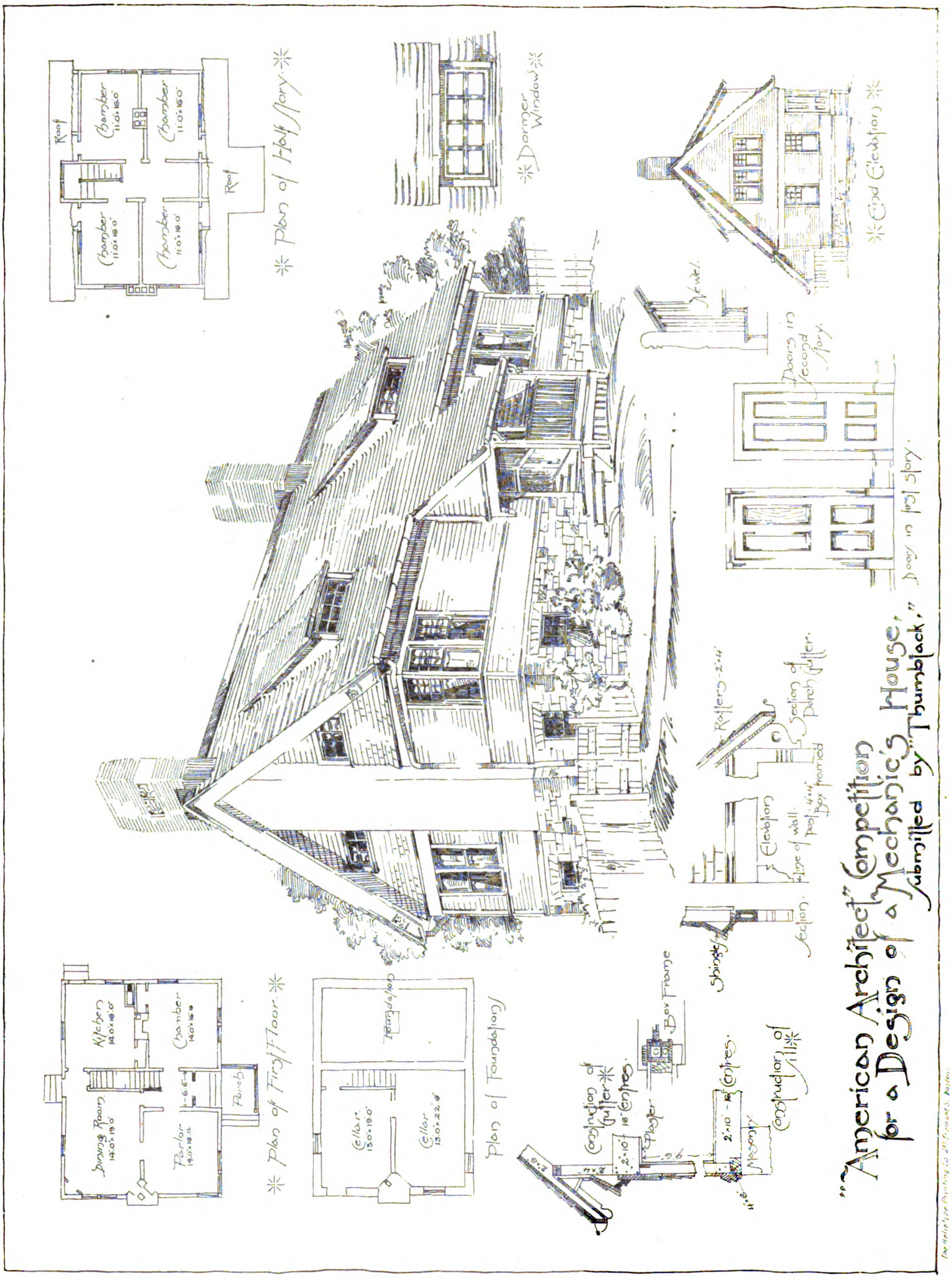
1882-3.

Adams & Muzzey,
Engineers in Charge
for the City

The Heliotype Printing Co. 211 Tremont St. Boston.

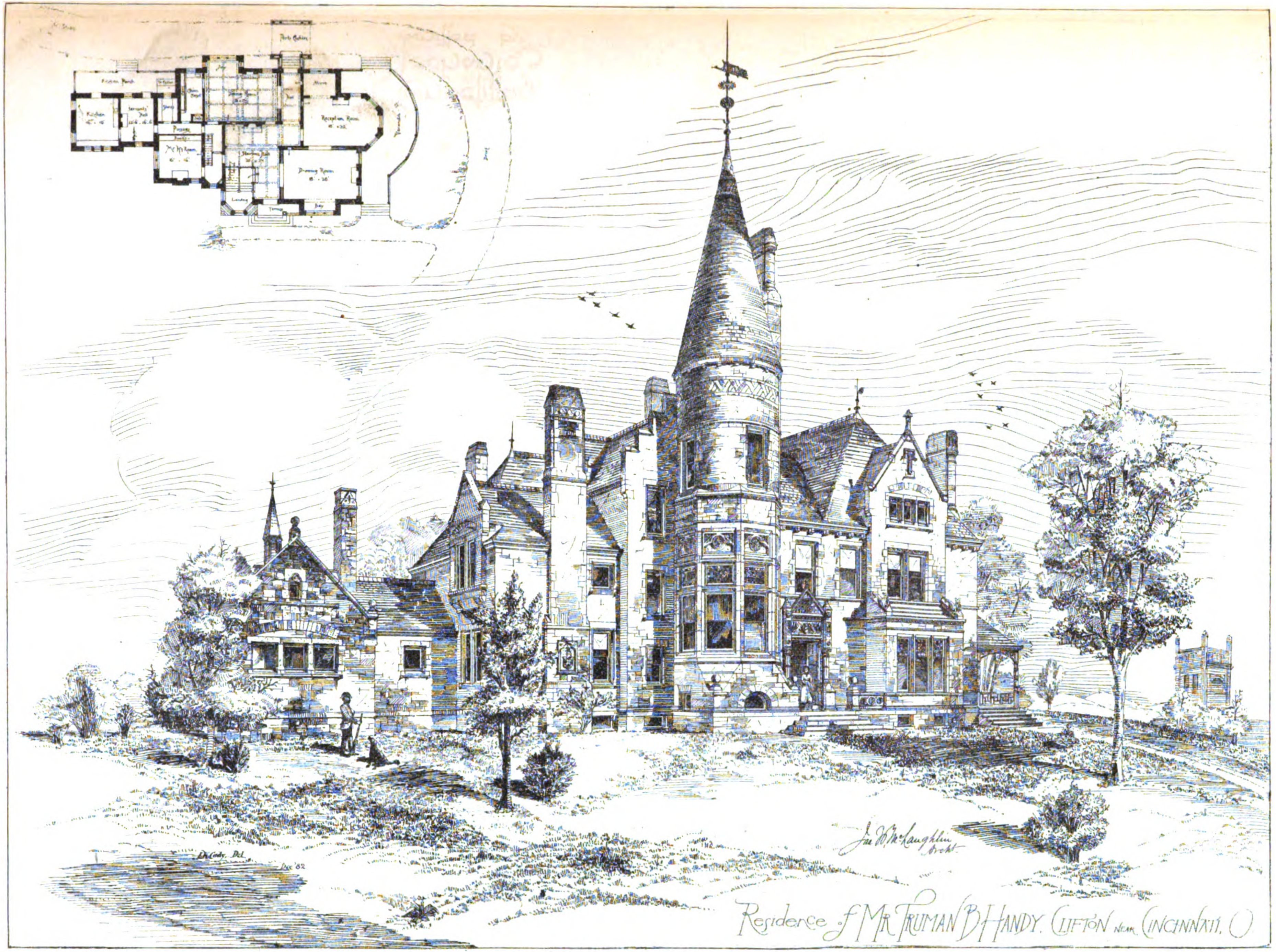
No. 410 American Architect and Building News, Nov. 3 1883.

The Heliotype Printing Co. 211 Tremont St. Boston



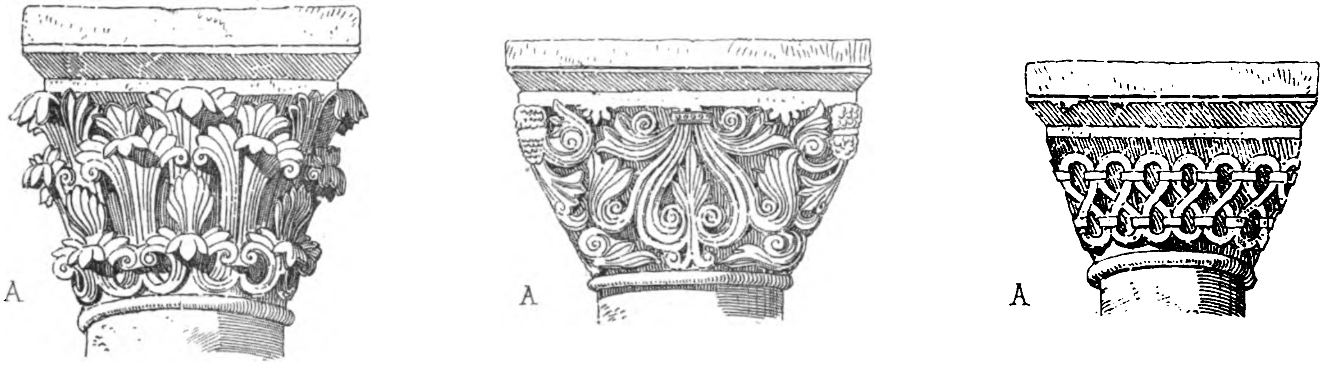
"American Architect" Competition for a Design of a Mechanic's House, Submitted by "Thumblack,"

The Heliotype Printing Co. 211 Tremont St. Boston.



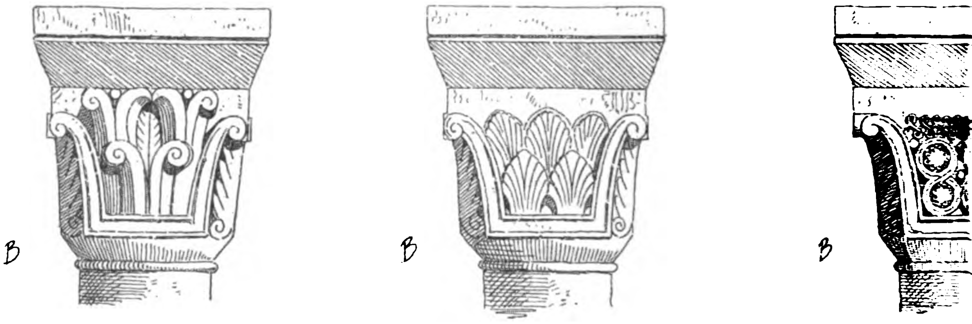
Residence of Mr Truman B Handy, Clifton near Cincinnati, O

The Heliotype Printing Co. 211 Tremont St. Boston

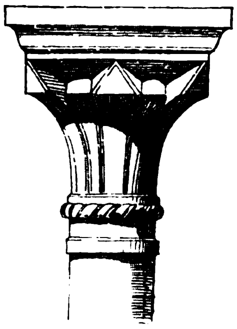


Capitals A A A A A. From the Church of St George, Bocherville

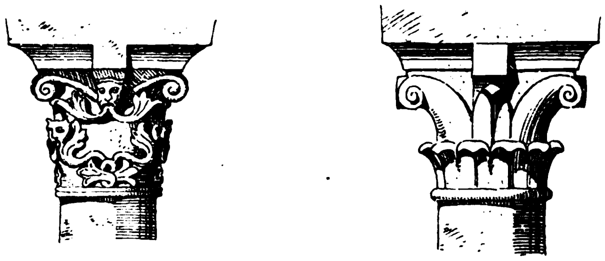
From Dijon France



B. B. B. B. B. From the Church, Saint Samson-Sur-Risl

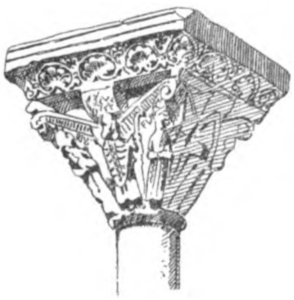


From Palace Finocchiara at Randazzo Sicily

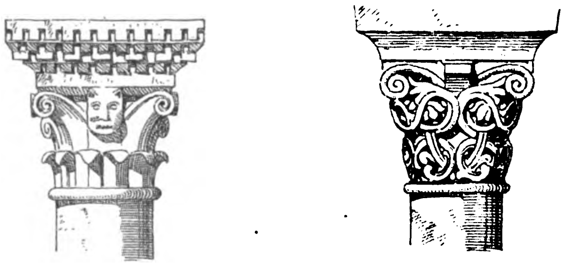


From the Crypt of Bayeux Cathedral, France.
Moniteur des Architectes

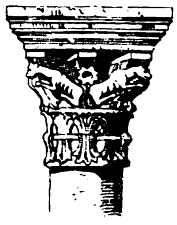
CAPI



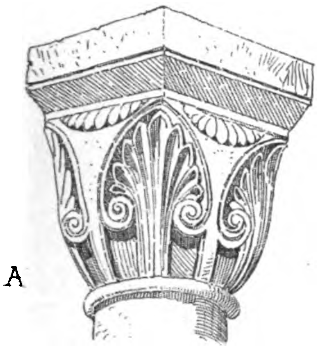
From the Cloister, Moissac, France



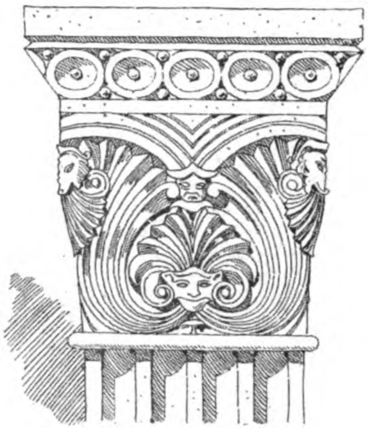
From the Crypt of Bayeux Cathedral, France
Moniteur des Architectes



From the Church of Sa



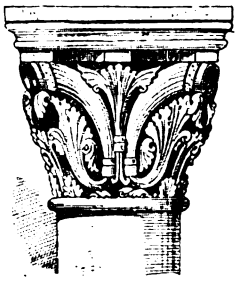
near Rouen. France. Moniteur des Architectes

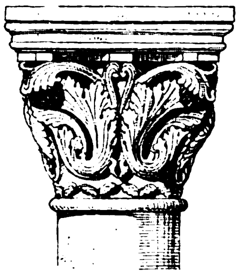


From the Church at Chezal Benoit. France

e. France.

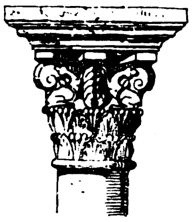
From the Cathedral at Sens. France



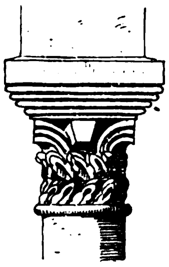


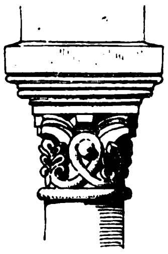
TALS.

C. C. C. C. From the Cathedral at Sens. France. Moniteur des Architectes



Cenou, Indre. France. Revue Générale de l'Architecture

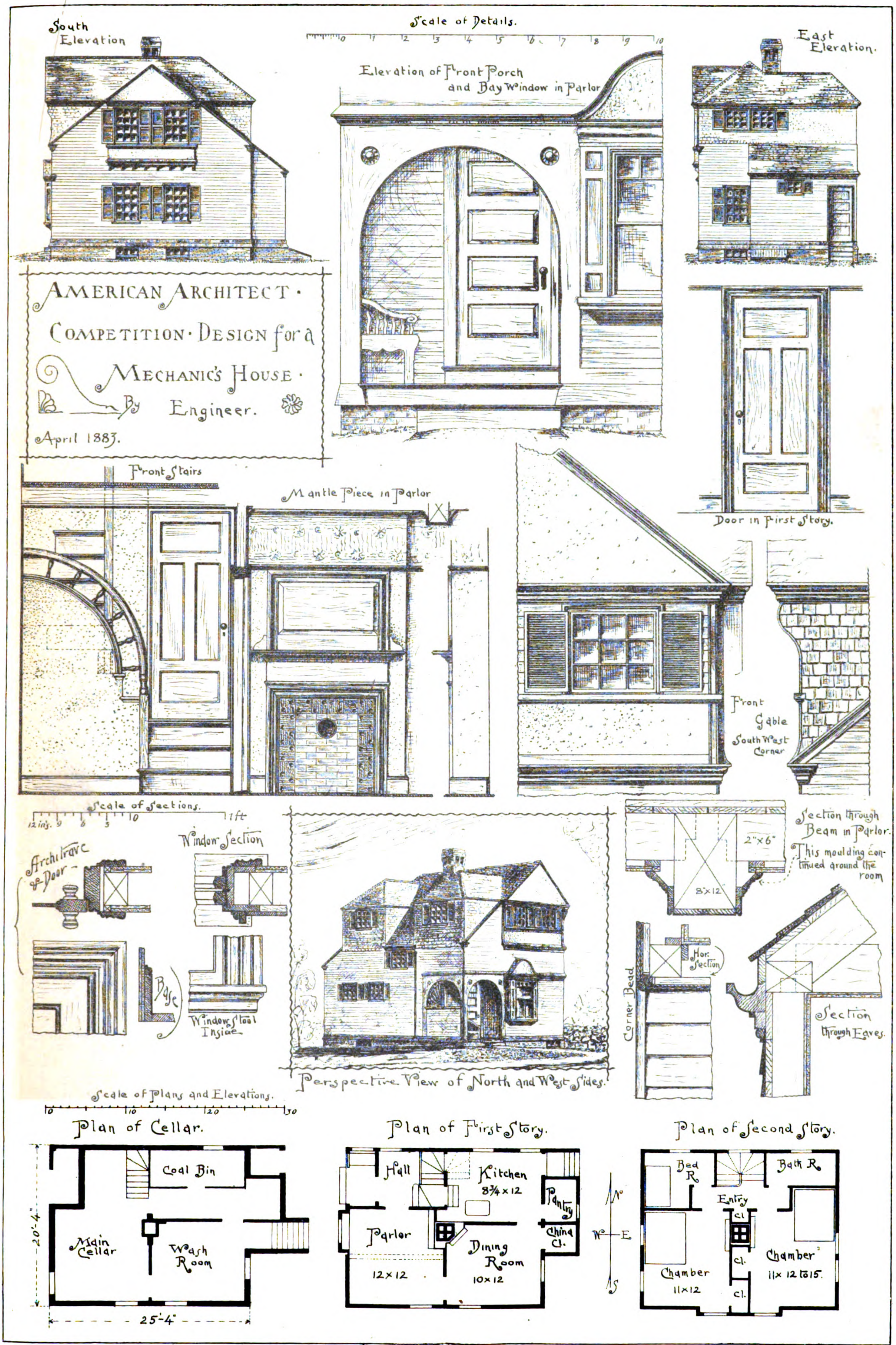




From the Abbey at Flavigney. France.

From the Cloister, Moissac France

Re-drawn for Reproduction by [illegible]

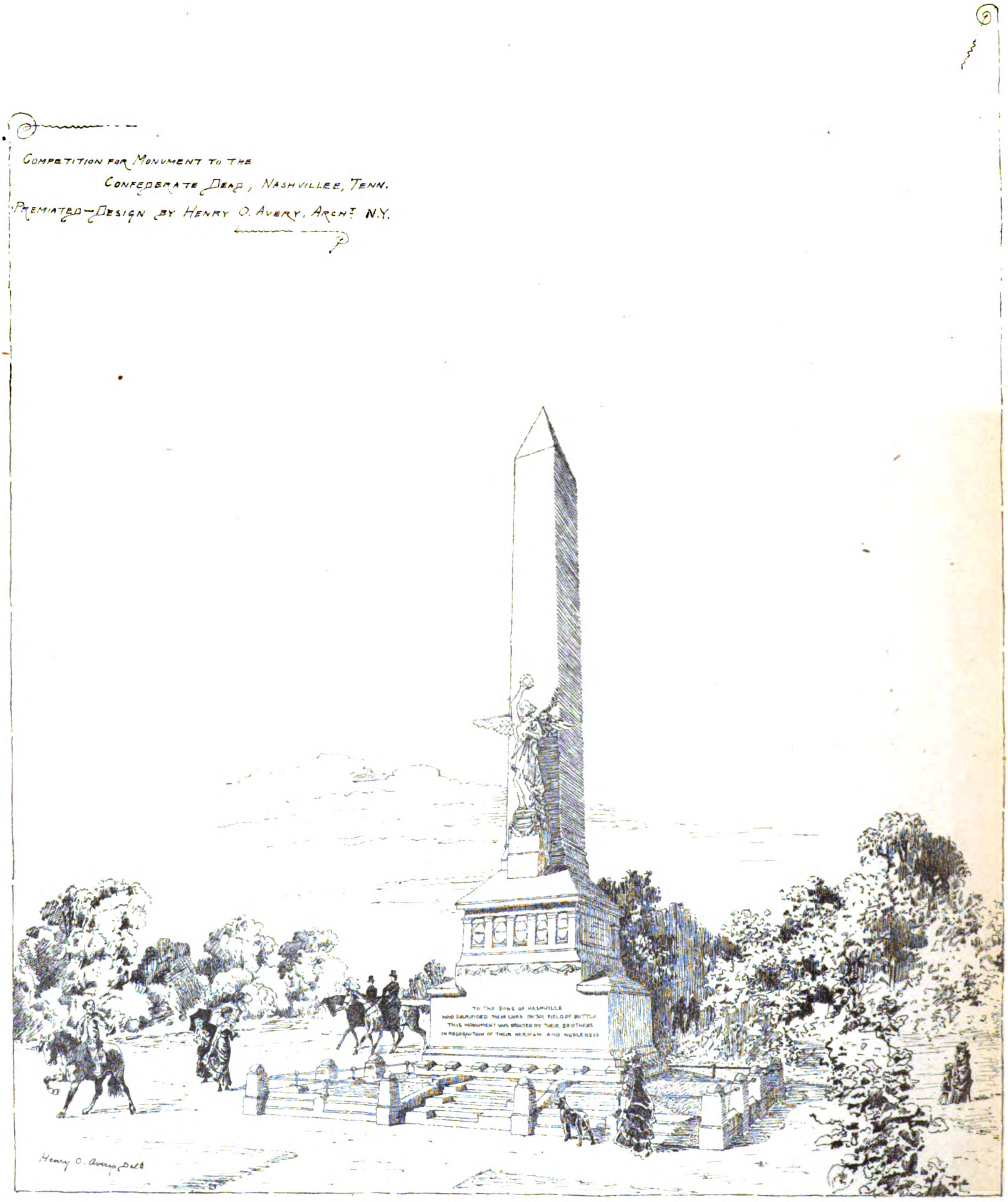


AMERICAN ARCHITECT · COMPETITION · DESIGN for a MECHANIC'S HOUSE · By Engineer.

April 1883.

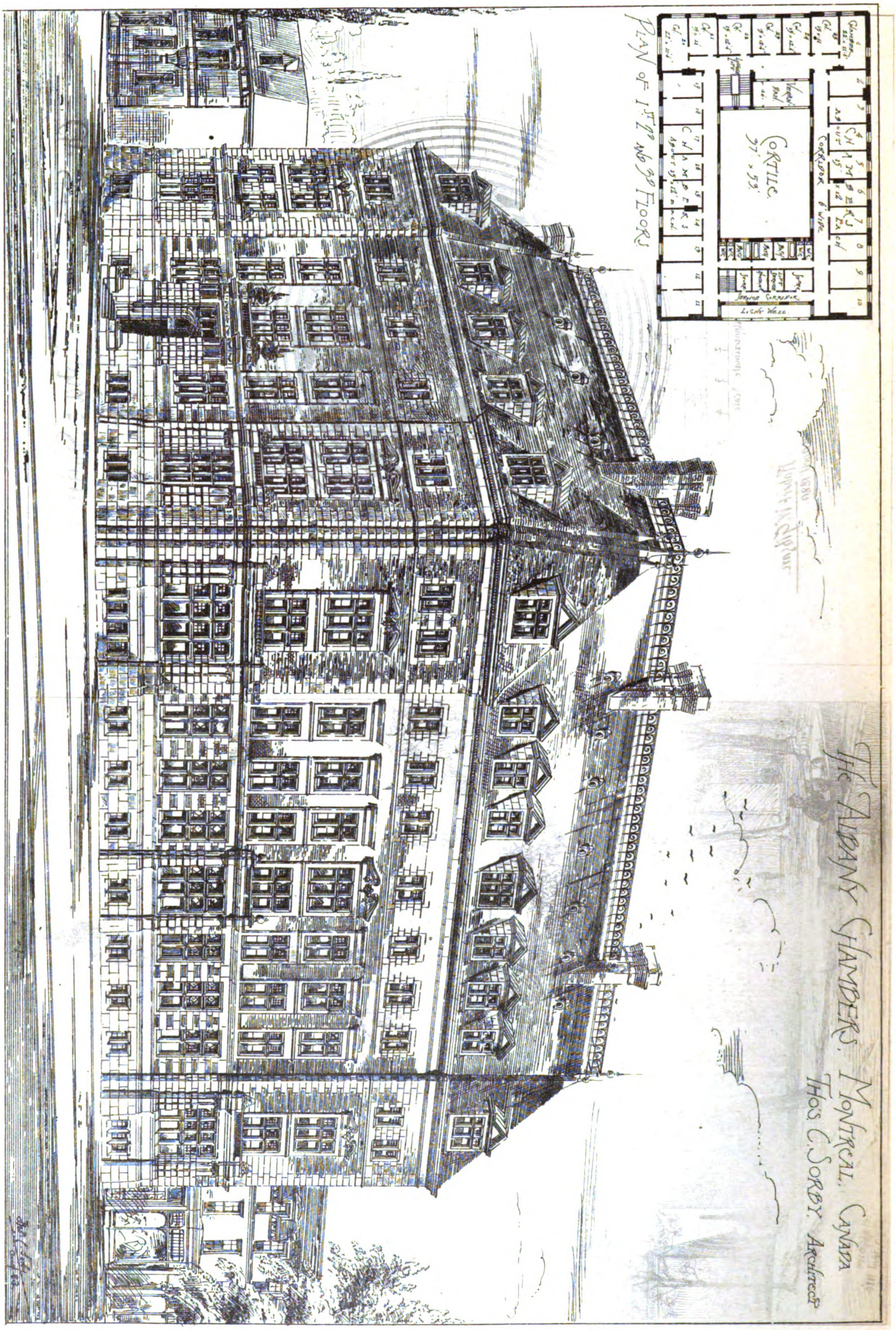
The Heliotype Printing Co. 211 Tremont St. Boston.

Nov. 10

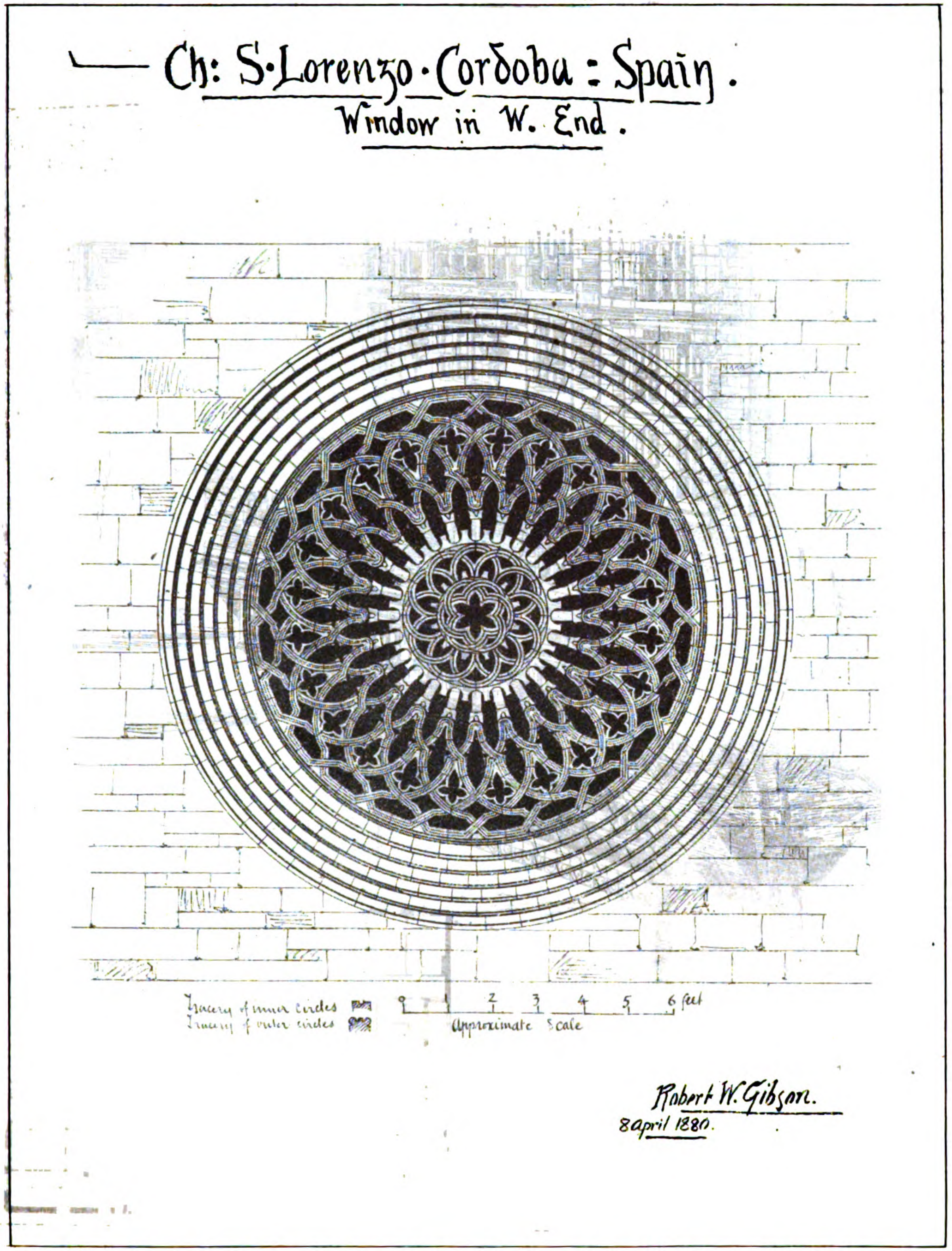


COMPETITION FOR MONUMENT TO THE
CONFEDERATE DEAD, NASHVILLE, TENN.
PREMIATED DESIGN BY HENRY O. AVERY, ARCHT. N.Y.

The Heliotype Printing Co. 211 Tremont St. Boston.

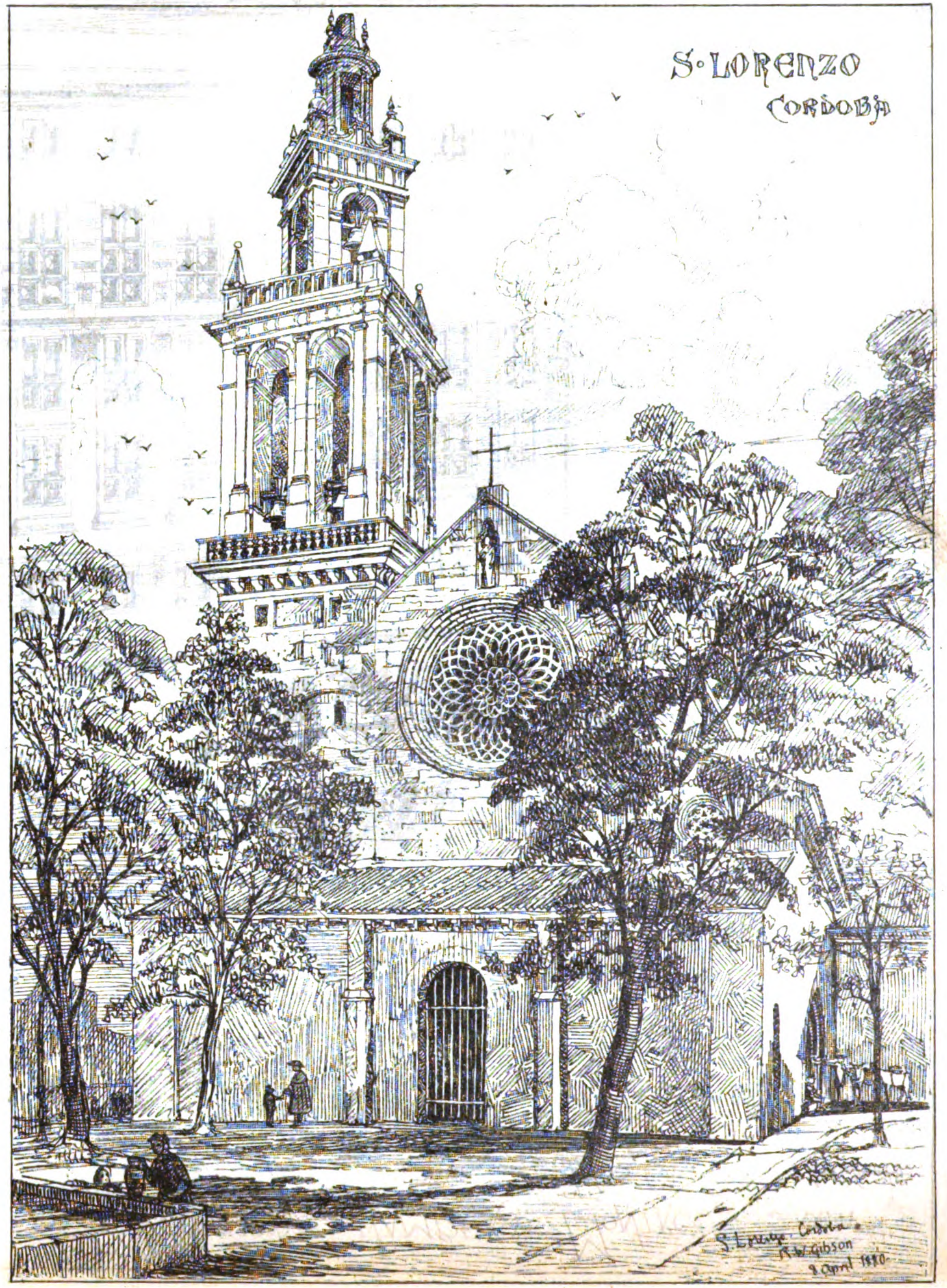

The Albany Chambers, Montreal, Canada
Thos. C. Sorby, Architect
Plan of 1st 2d and 3d Floors
Cortile 37' × 53'
Corridor 6' wide
Chambers about 15' × 12' each
Service Corridor
Light Well

AMERICAN ARCHITECT AND BUILDING NEWS, NOV. 10. 1883. No. 411



Ch: S. Lorenzo. Cordoba : Spain.
Window in W. End.

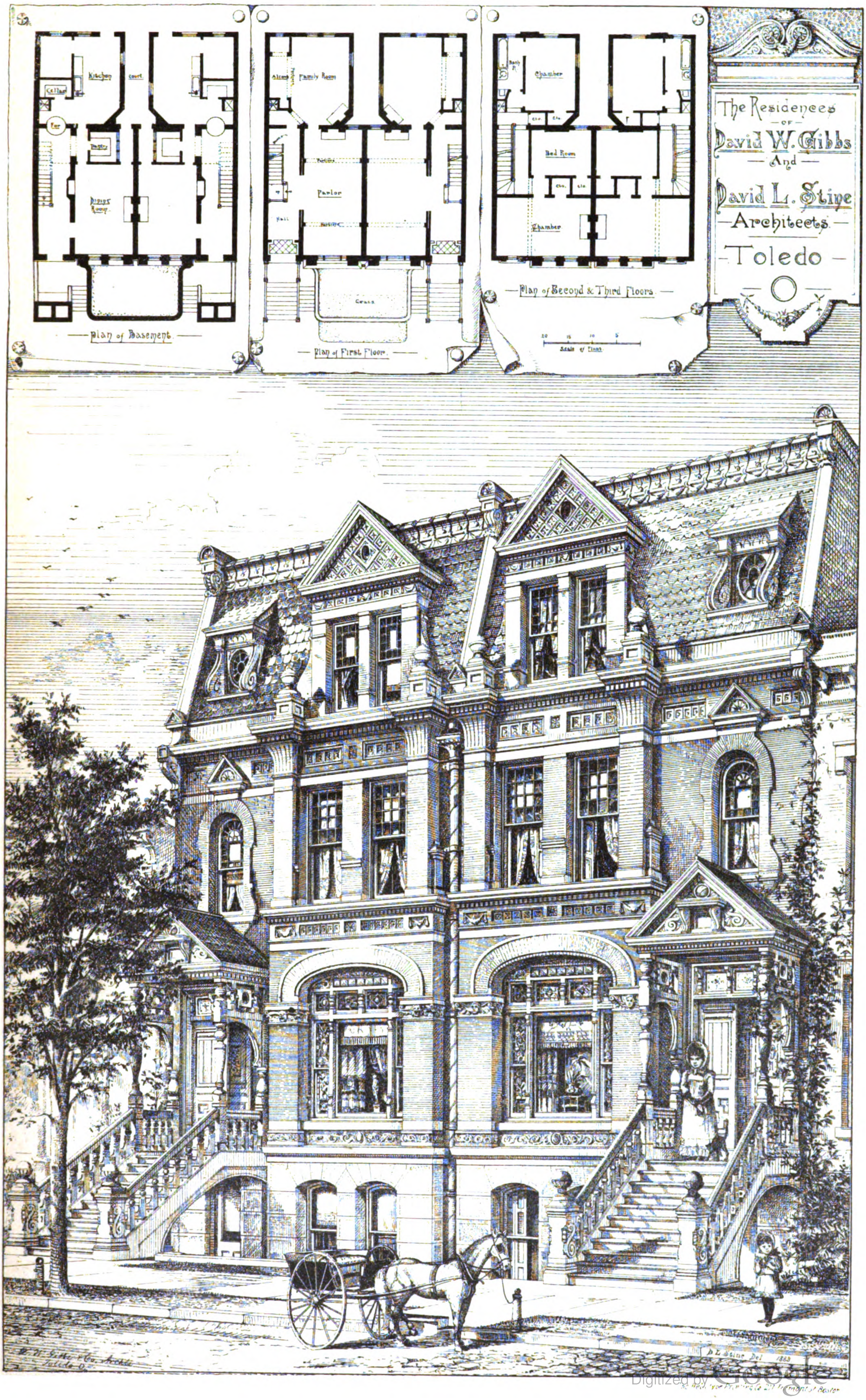
Robert W. Gibson.
8 april 1880.



S. LORENZO
CORDOBA

The Heliotype Printing Co. 211 Tremont St. Boston.

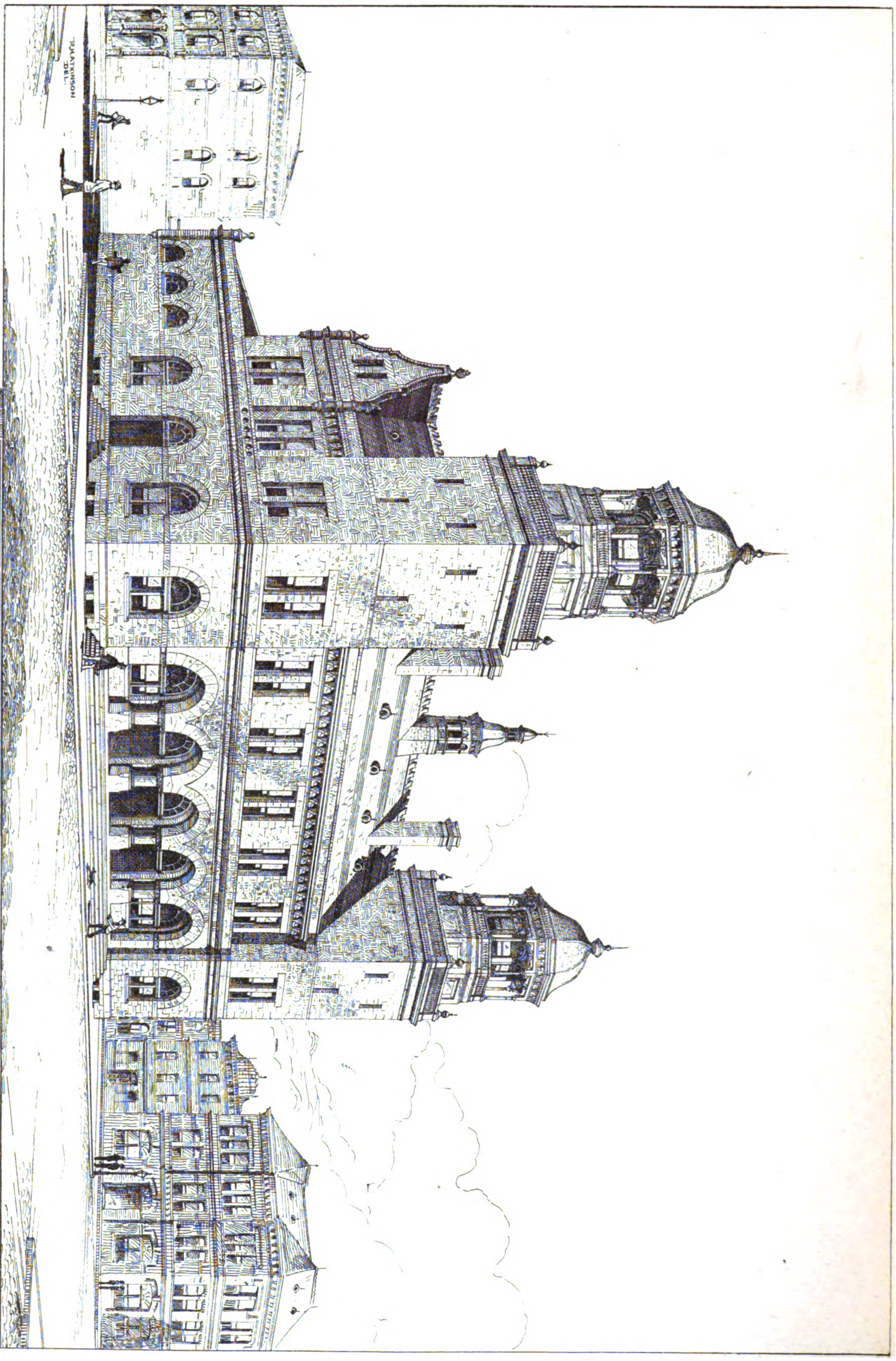
AMERICAN ARCHITECT AND BUILDING NEWS. NOV. 10 1883. No. 411



The Residences of David W. Gibbs And David L. Stine Architects Toledo

Heliotype Printing Co. 211 Tremont St Boston

Nov. 17

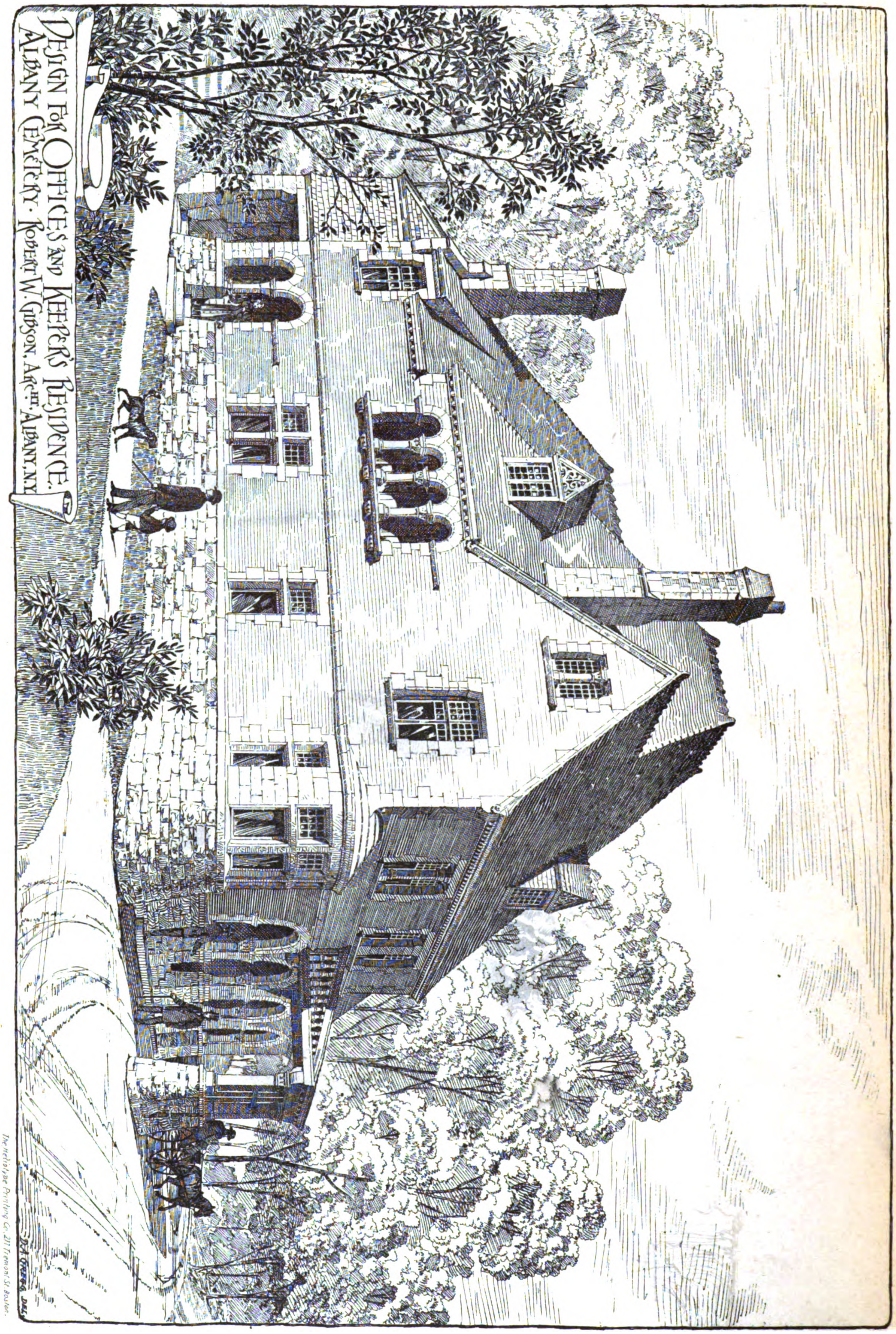


U.S. POST OFFICE.

MINNEAPOLIS, MINN.

JAS. G. HILL
SUPERVISING ARCHITECT
TREASURY DEPARTMENT.

The Heliotype Printing Co. 211 Tremont St. Boston.



Design for Offices and Keeper's Residence.
Albany Cemetery. Robert W. Gibson, Arch't. Albany, N.Y.

D. A. Gregg Del.

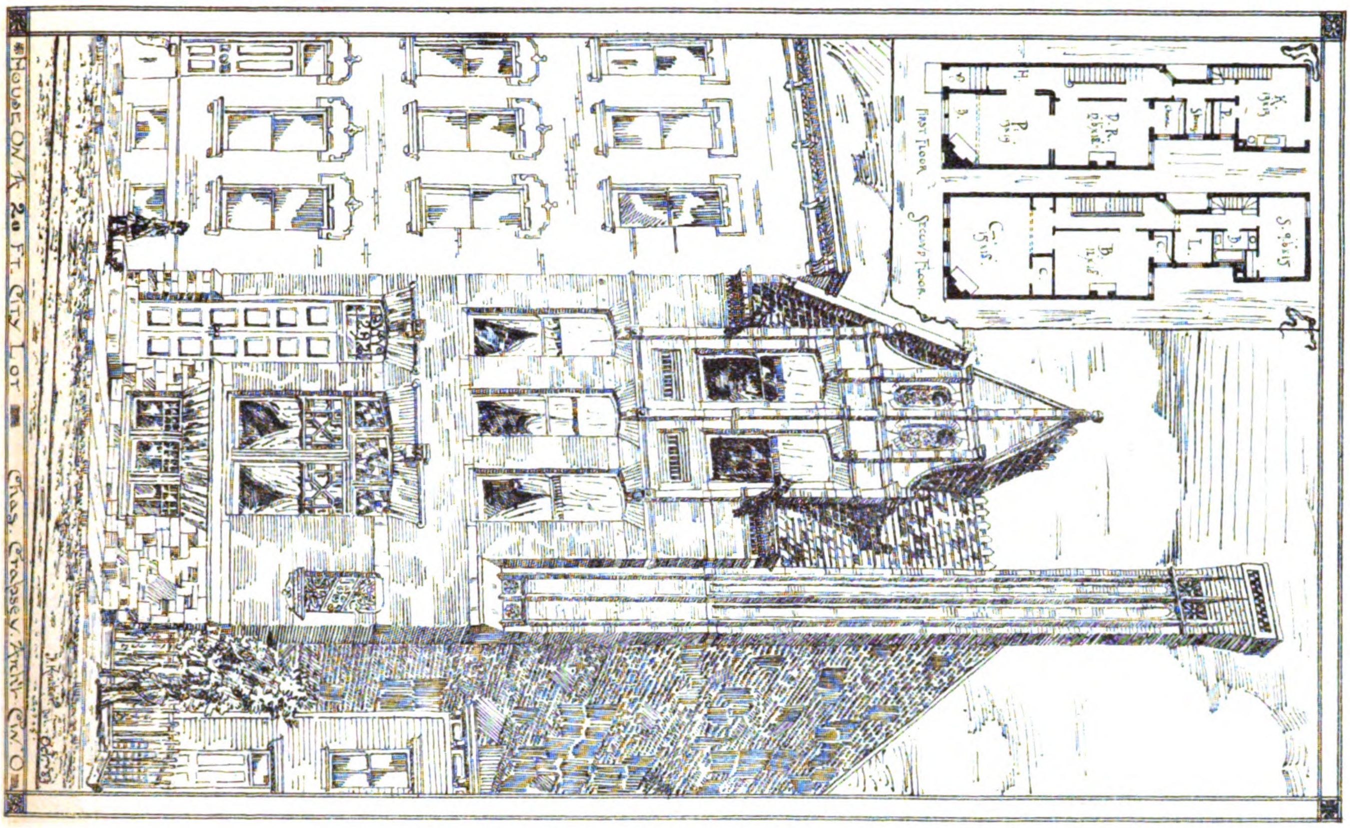
The Heliotype Printing Co. 211 Tremont St. Boston.

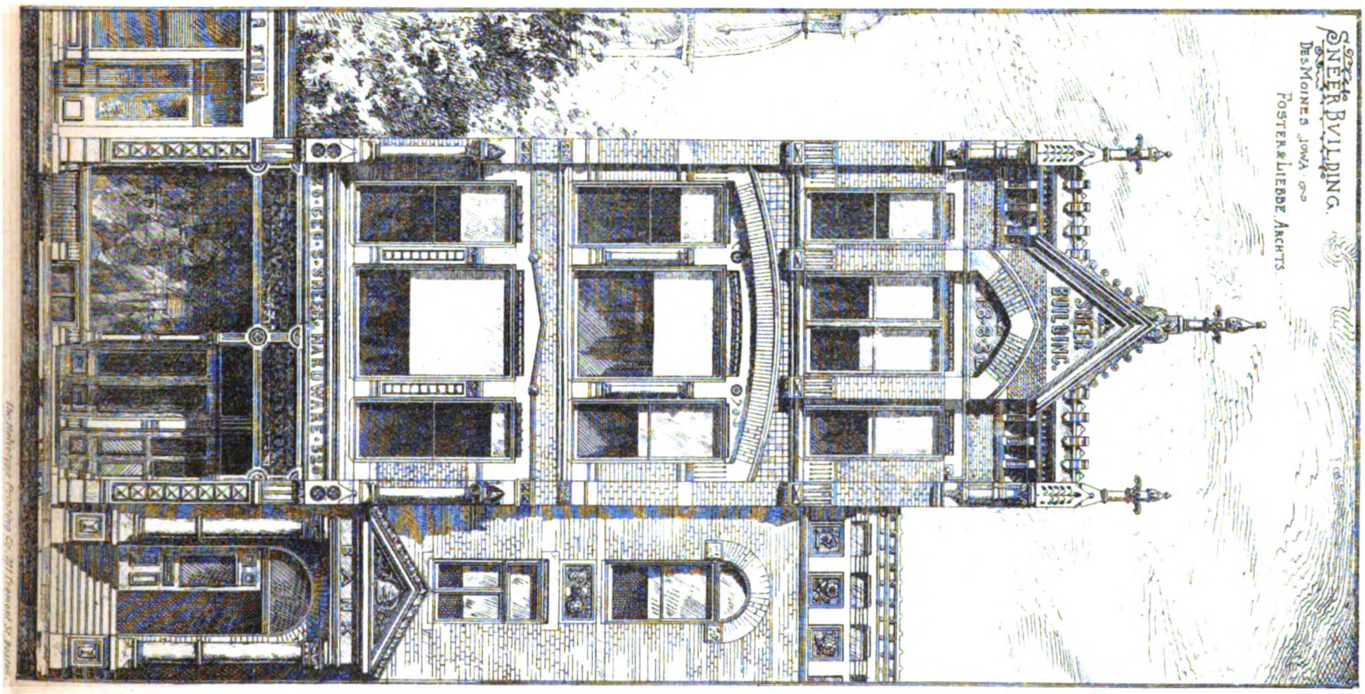
AMERICAN ARCHITECT AND BUILDING NEWS. NOV. 17. 1883. No. 412

INDIAN GROUP, FOR
LINCOLN PARK.
CHICAGO. ILL.
JOHN BOYLE.
SCULPTOR.

The Heliotype Printing Co. 211 Tremont St. Boston

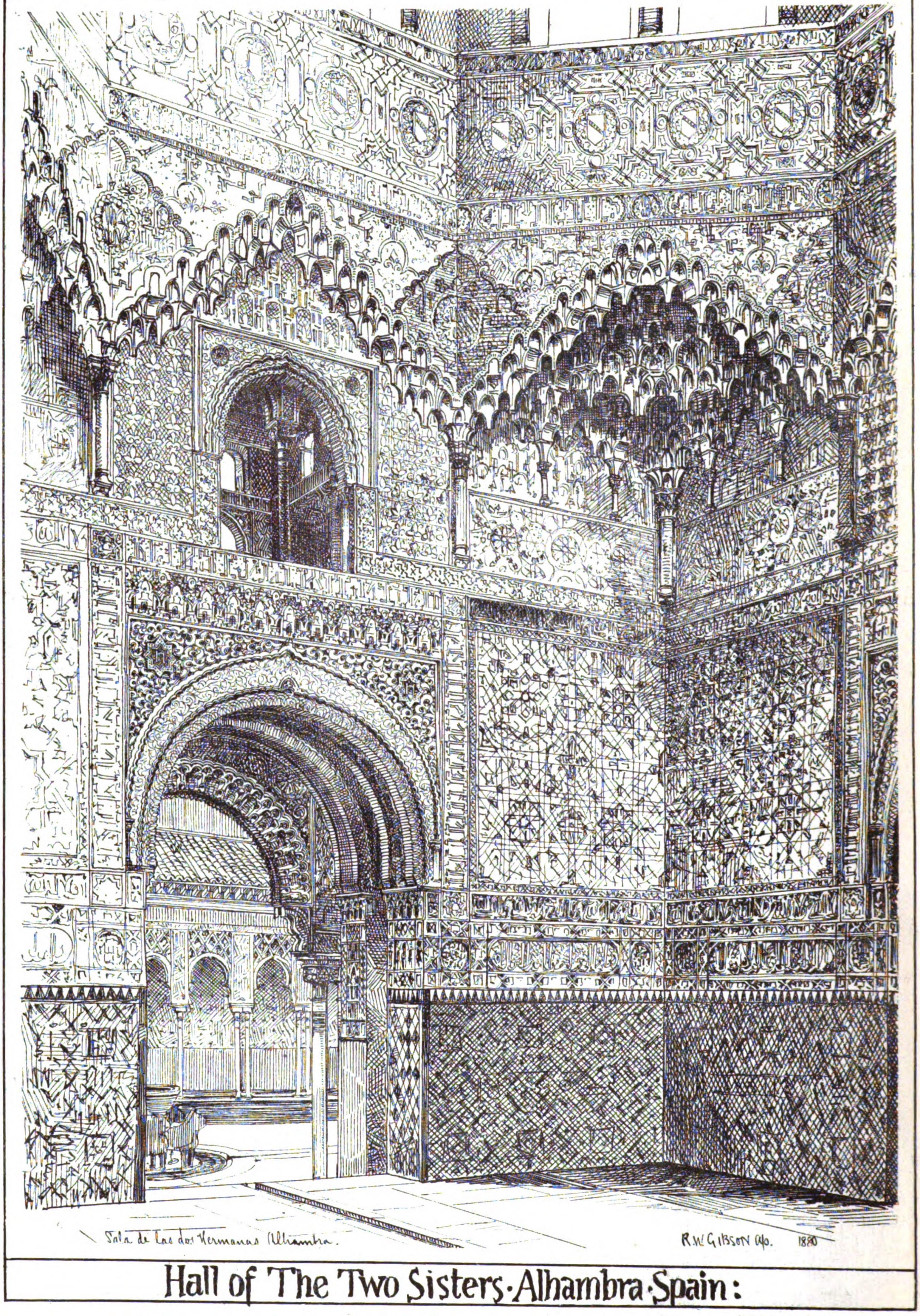
American Architect and Building News, Nov. 17. 1883. No. 412





Nov - 24

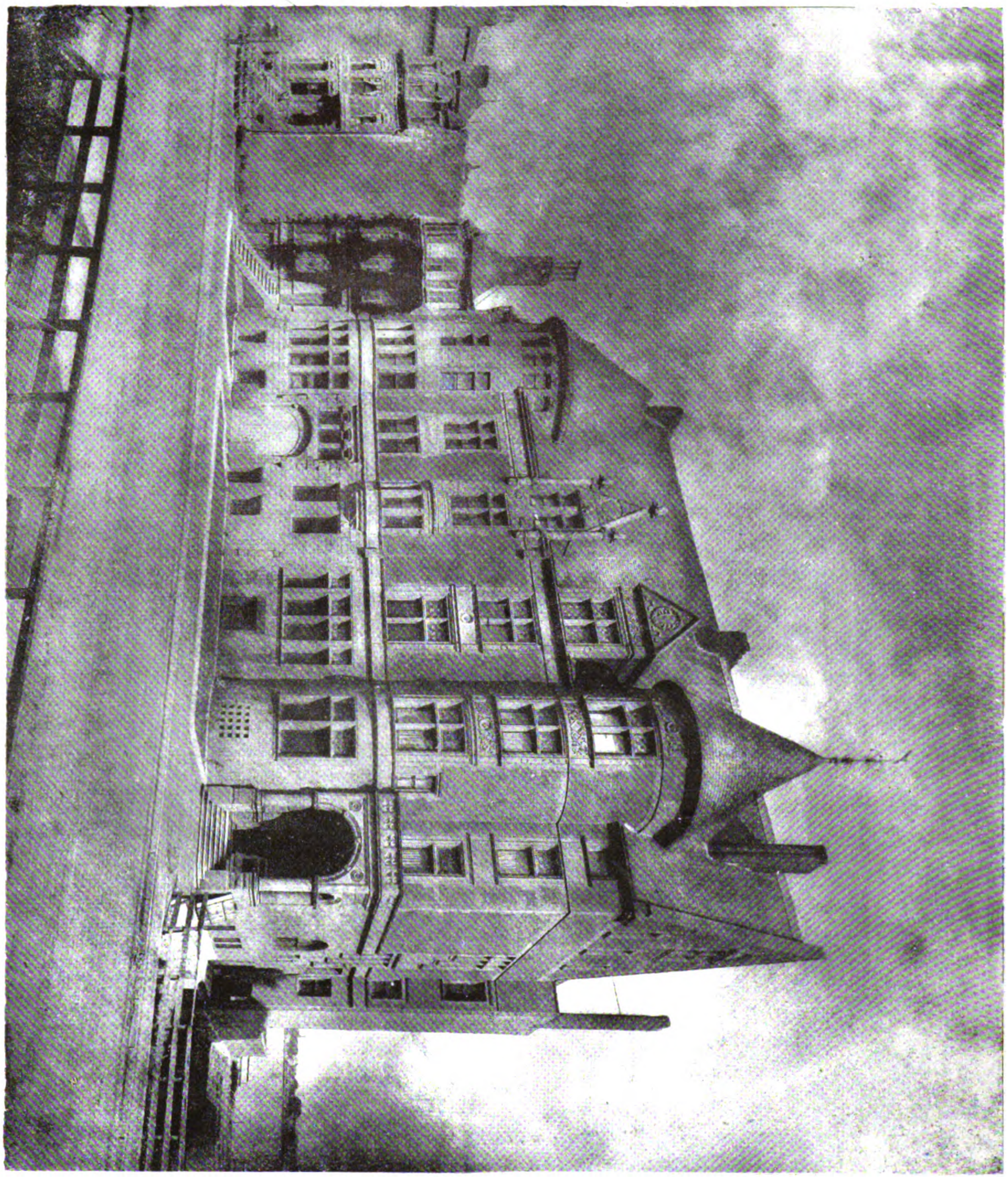
No. 413 American Architect and Building News, Nov. 24_1883.



Hall of The Two Sisters · Alhambra · Spain:

The Heliotype Printing Co. 211 Tremont St. Boston.

No. 413 American Architect and Building News, Nov. 24. 1883.



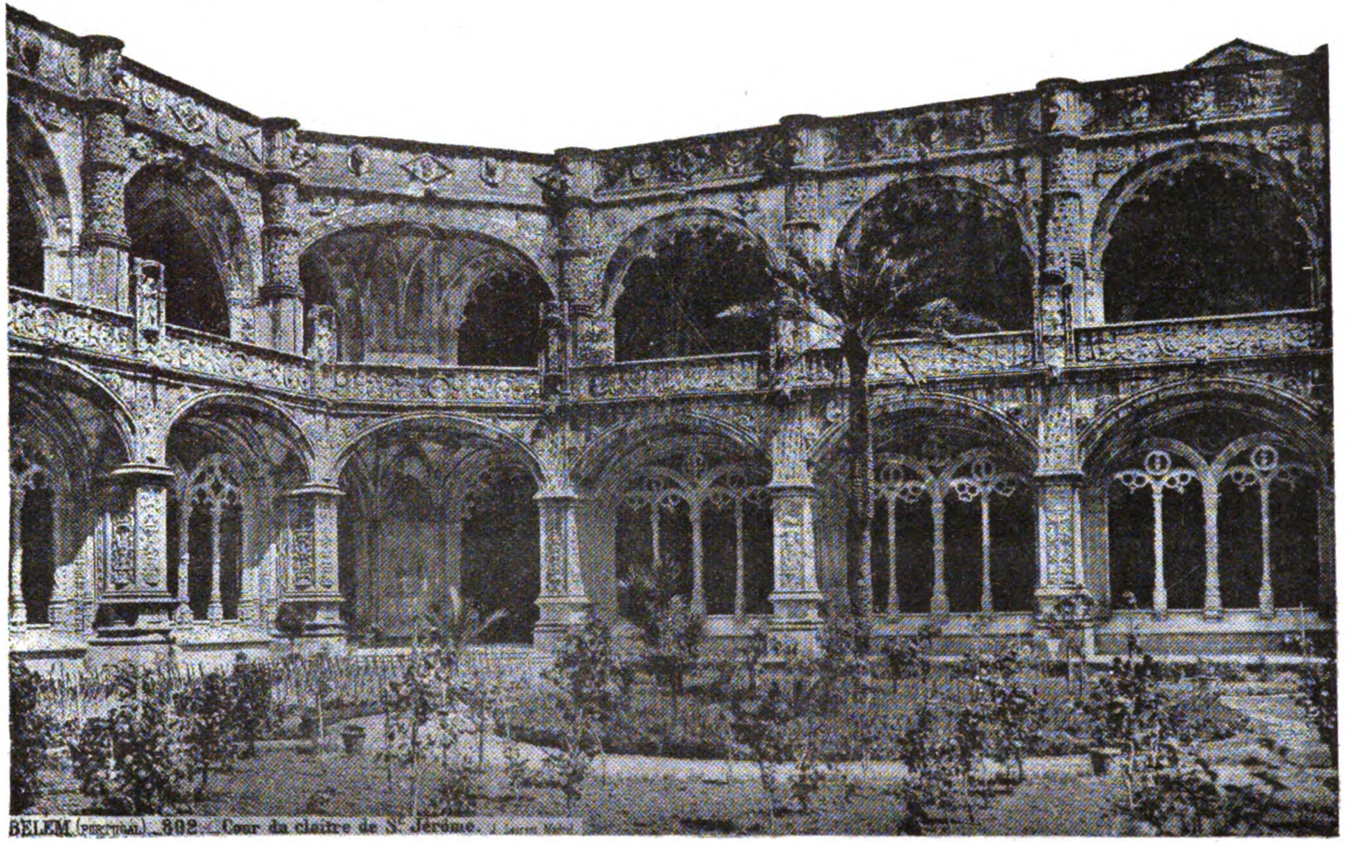
The Heliotype Printing Co. 211 Tremont St. Boston

For F. L. Higginson Esq. — Houses on Beacon St. — For C. A. Whittier, Esq.

H. H. Richardson, Arch't.
Boston.

Boston, Mass.

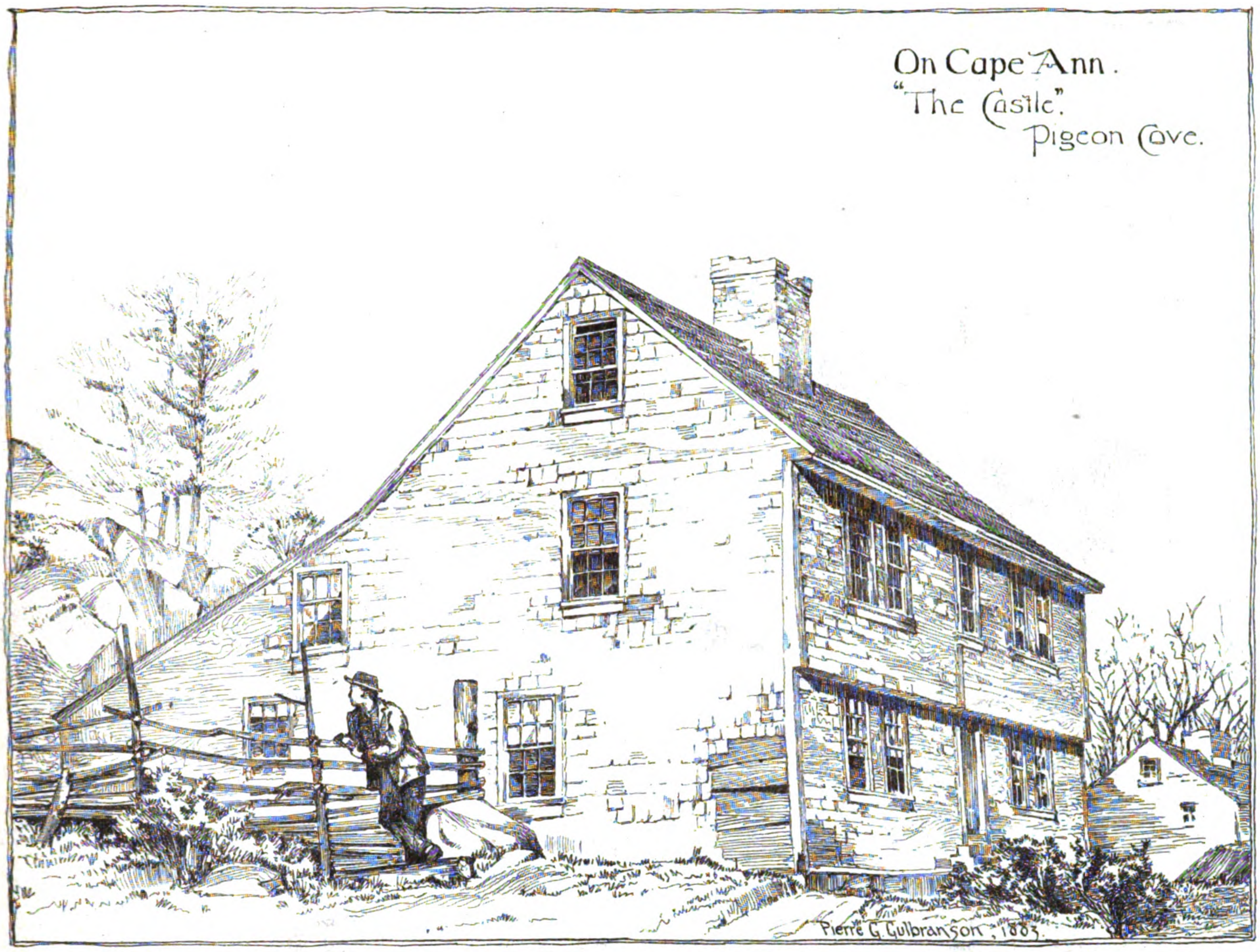
McKim, Mead & White, Arch'ts.
New York.



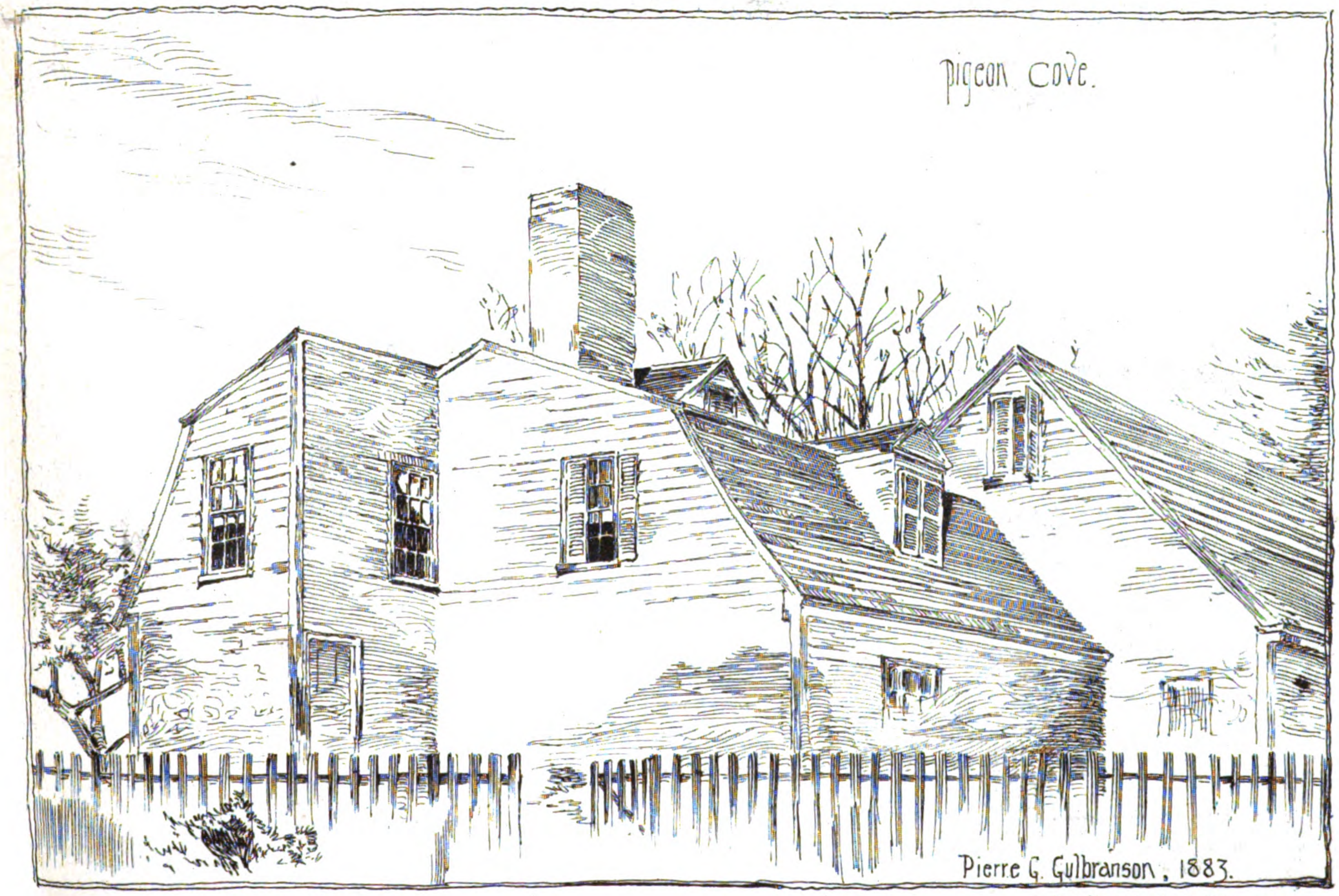
BELEM (PORTUGAL) _802_ Cour du cloître de St Jérôme.

The Heliotype Printing Co. 211 Tremont St. Boston

AMERICAN ARCHITECT AND BUILDING NEWS, NOV. 24 1883. No. 413

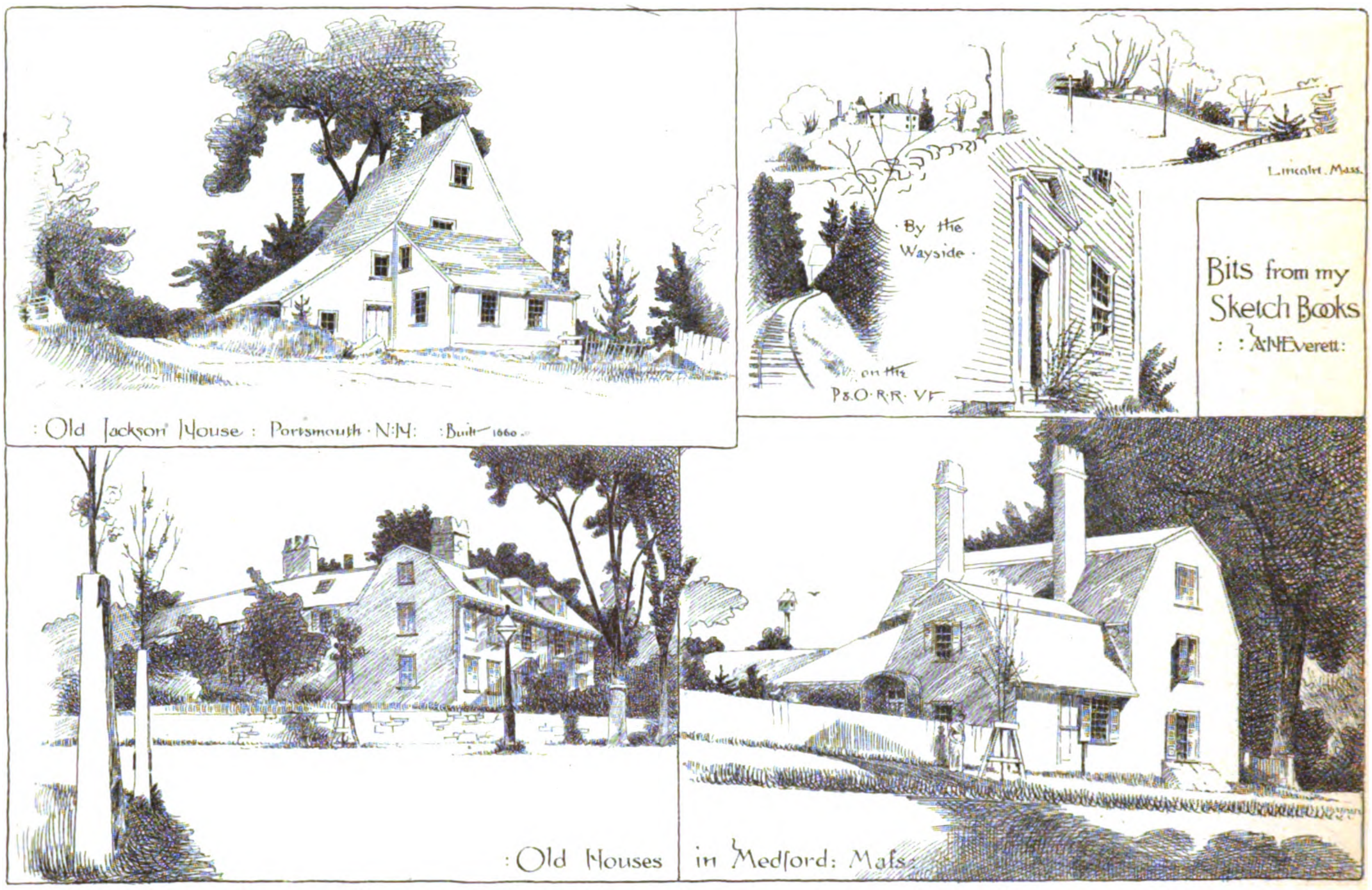


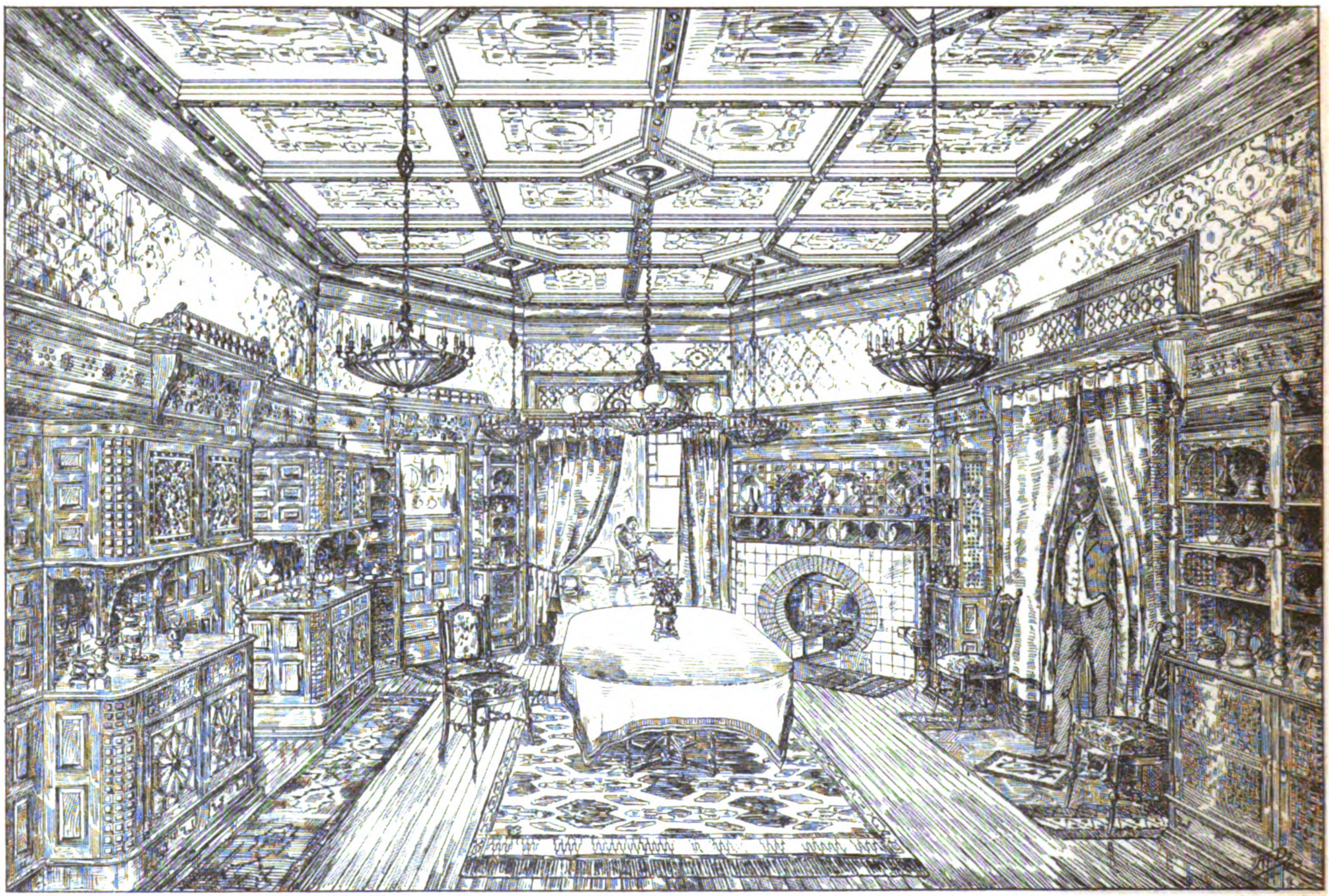
On Cape Ann.
"The Castle".
Pigeon Cove.



Pigeon Cove.

The Heliotype Printing Co. 211 Tremont St. Boston

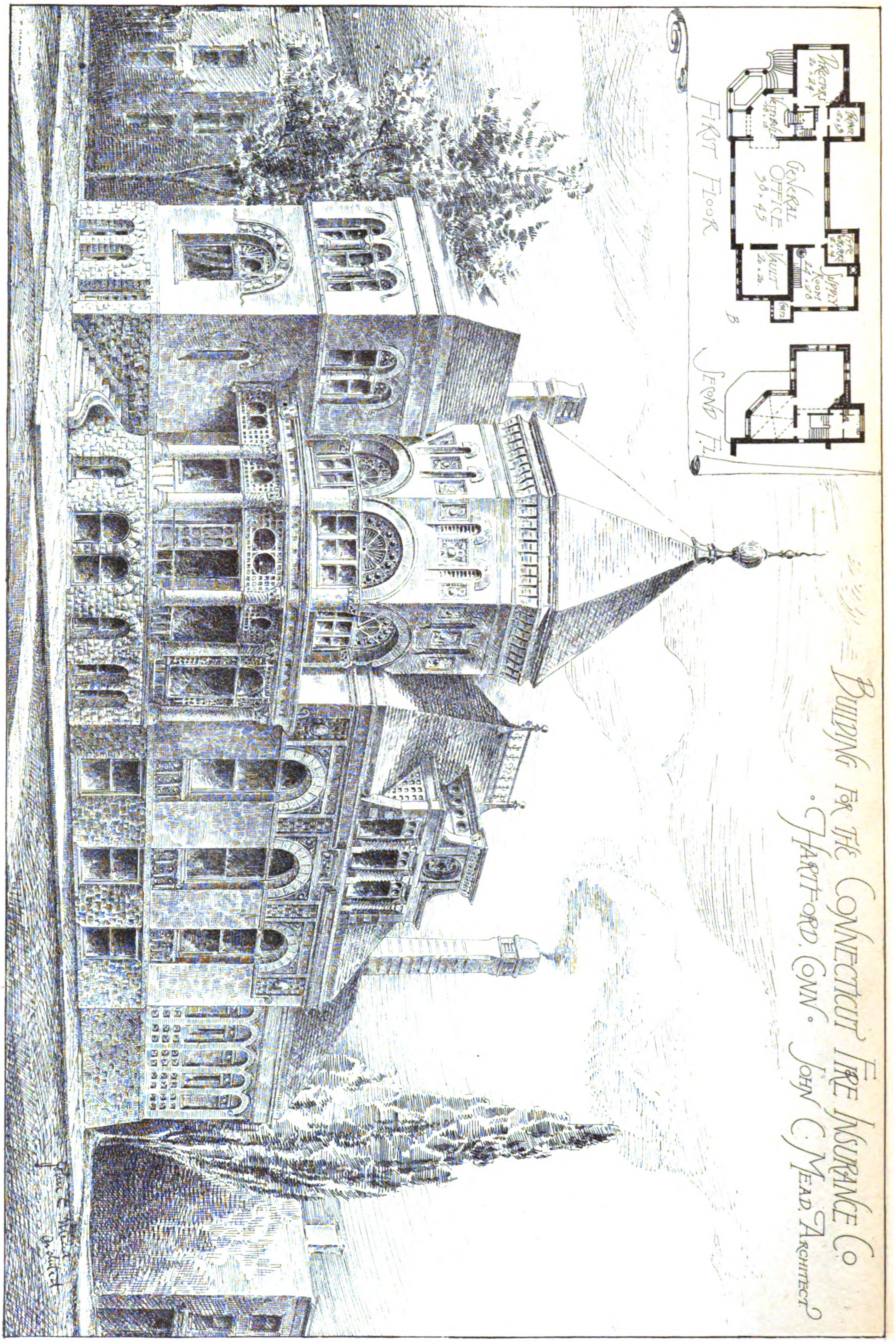




The Heliotype Printing Co 211 Tremont St Boston

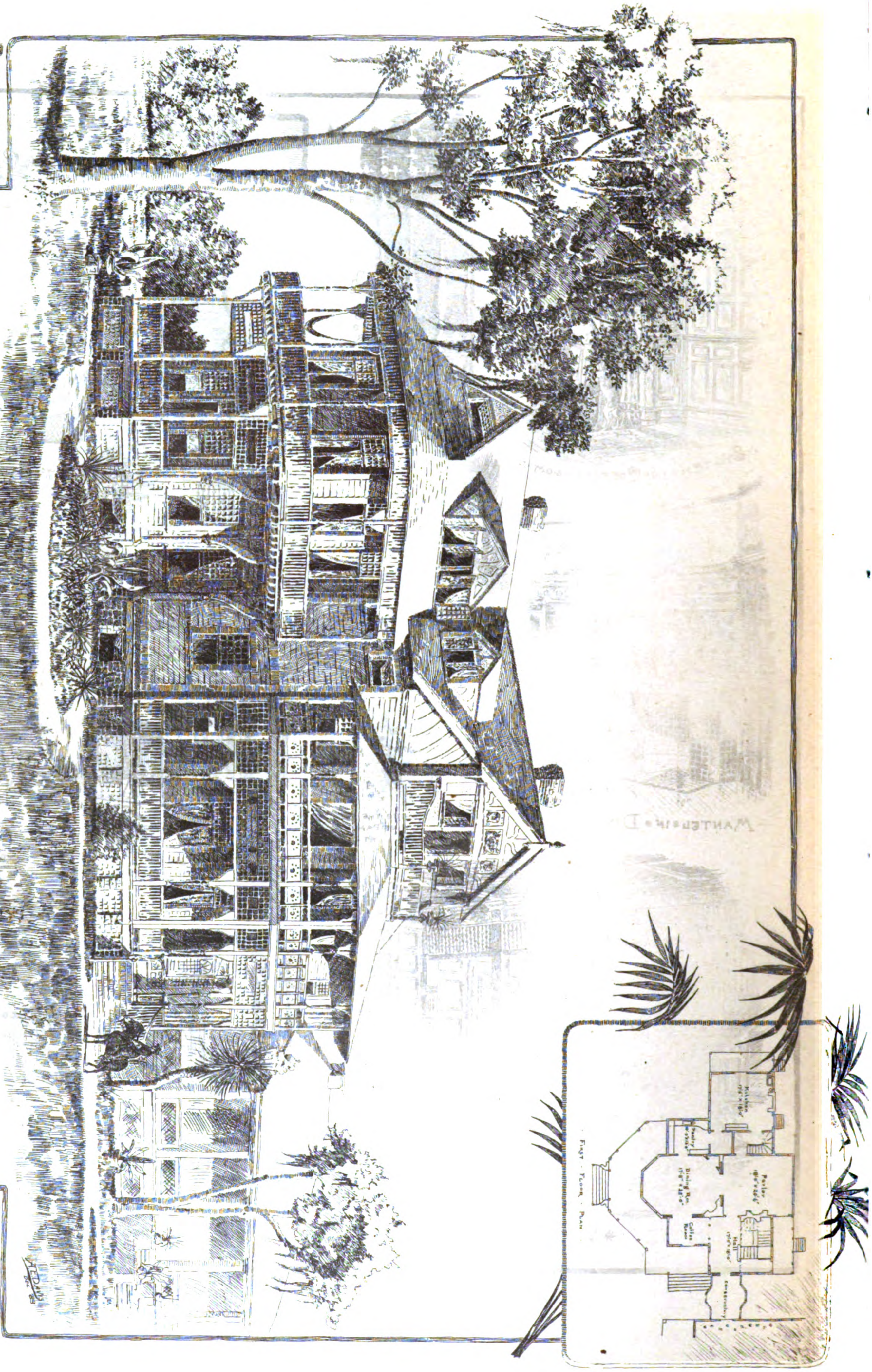
Dining Room Interior *for a* House *at* San Antonio, Texas.

Charles I. Berg, Architect, New York.



Building for the Connecticut Fire Insurance Co. Hartford, Conn. John C. Mead, Architect

Residence at San Antonio, Texas.



Chas. I. Berg · Architect · New York.

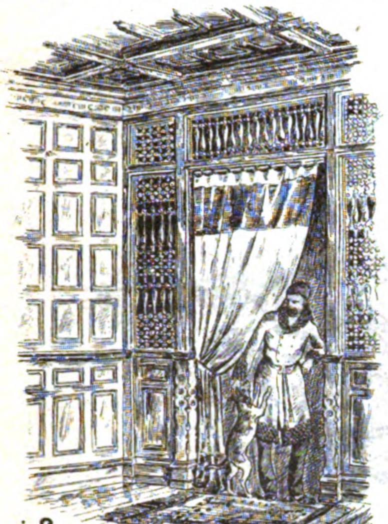
The Heliotype Printing Co. 211 Tremont St. Boston.

INTERIOR SKETCHES

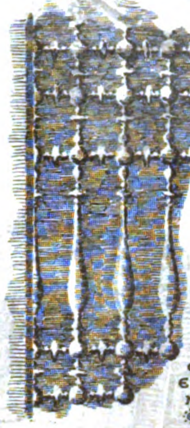
RESIDENCE AT

SAN ANTONIO
TEXAS

CHAS. I. BERG ARCHT
NEW YORK



SKETCH IN COFFEE ROOM

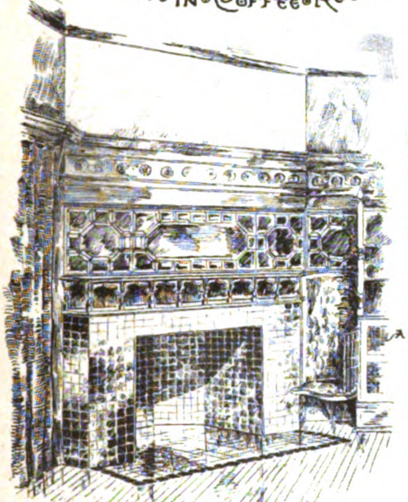


A BIT OF THE SCREEN

NEWEL

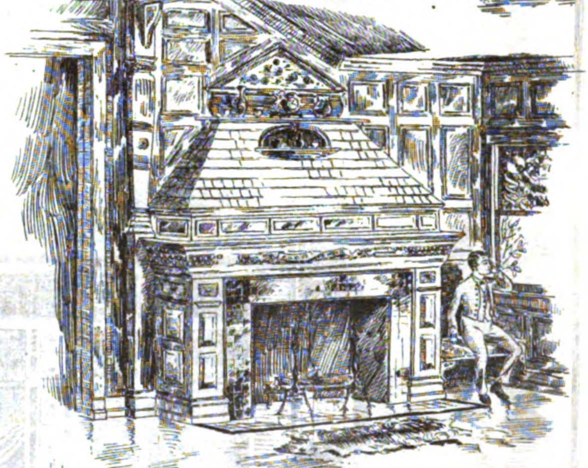
Sketch of BRASS PANELS FOR DINING ROOM CEILING

HALVED SPINDLE ROSETTES SET IN DINING ROOM FRIEZE

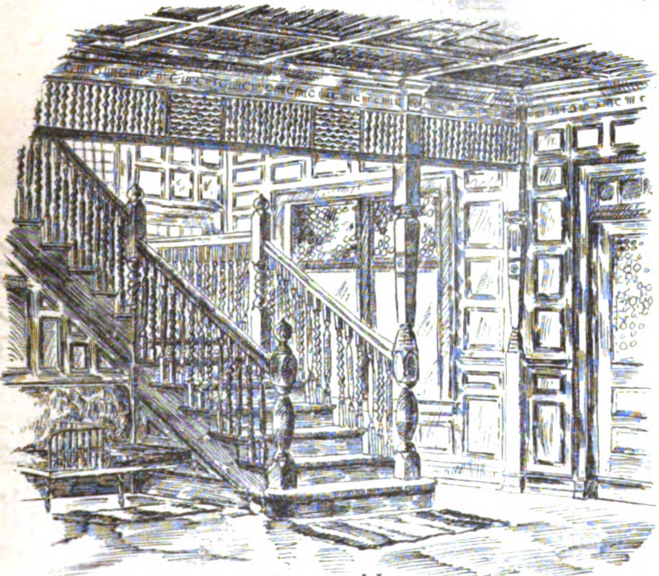


MANTEL IN DINING ROOM

SKETCH SHOWING THE CONSTRUCTION OF PANELS AT A



MANTEL UNDER STAIRCASE IN MAIN HALL



VIEW IN HALL

BALUSTERS

CONSERVATORY

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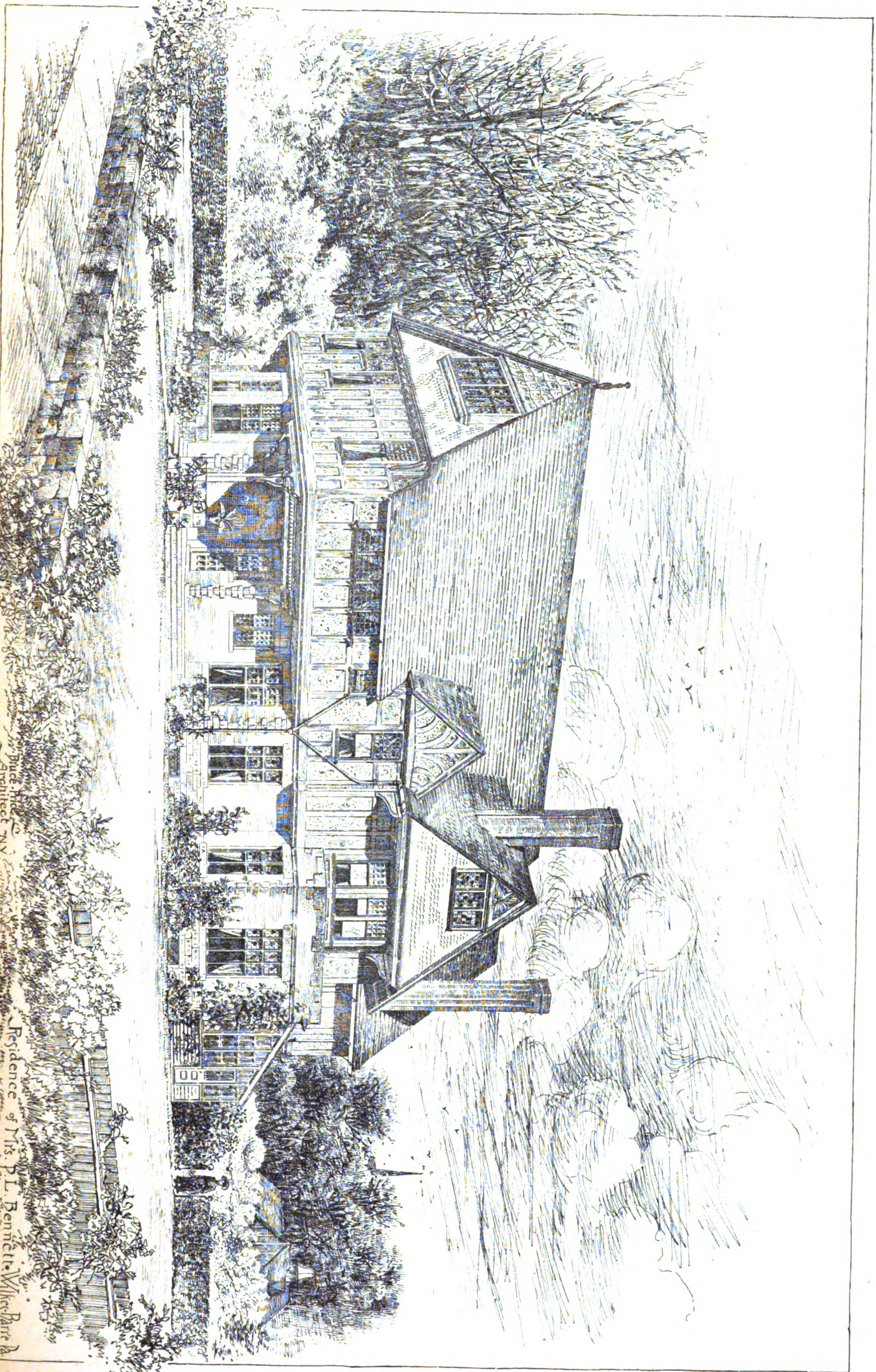

Residence of Mrs. P.L. Bennett. Wilkes-Barre Pa.

Bruce Price Architect N.Y.

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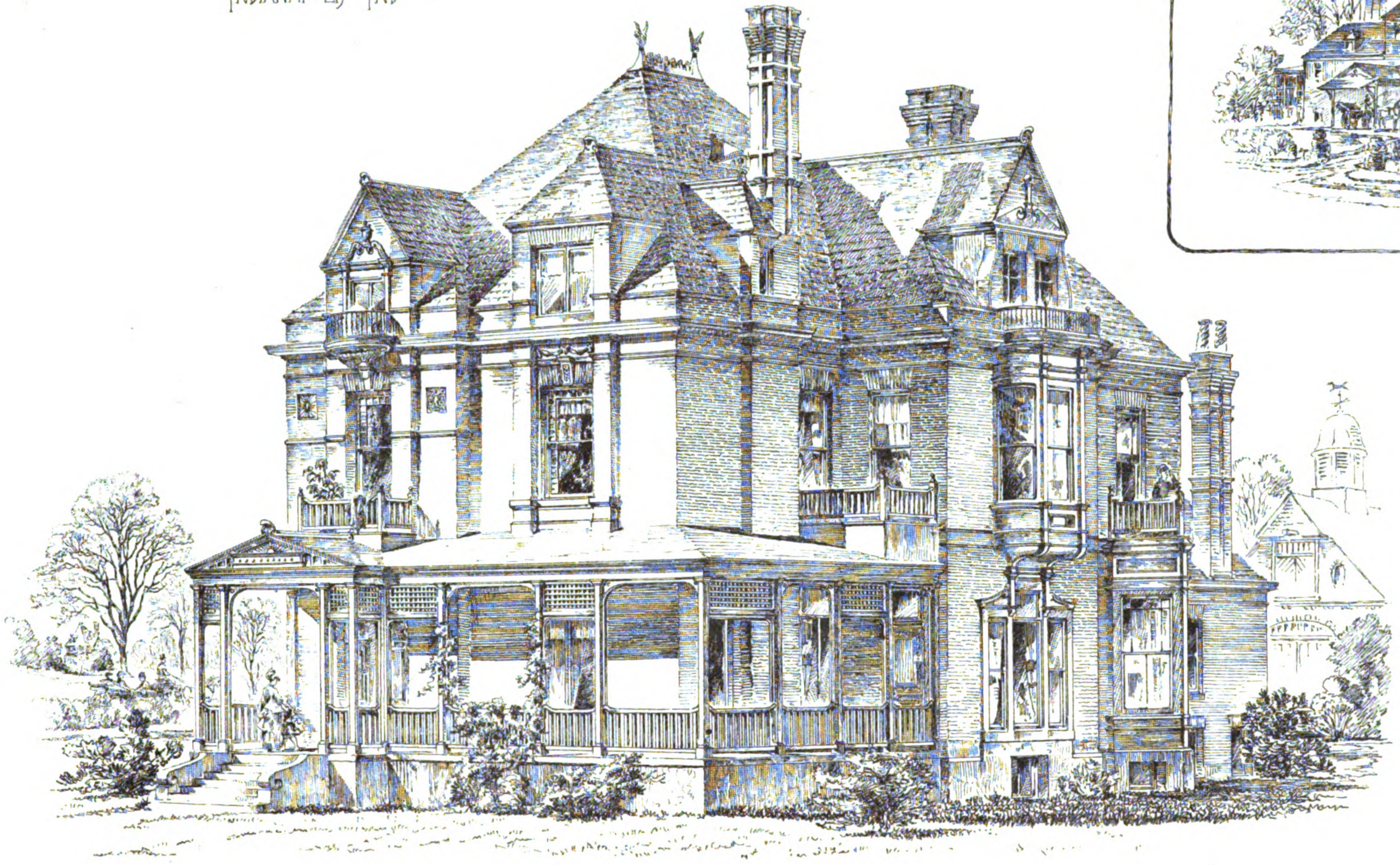
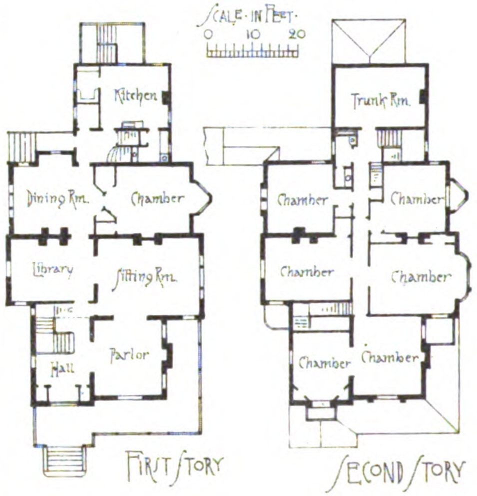
American Architect and Building News, Dec. 1 1883. No. 414.

HOUSE FOR A. H. NORDYKE ESQ.

INDIANAPOLIS · IND



Sketch

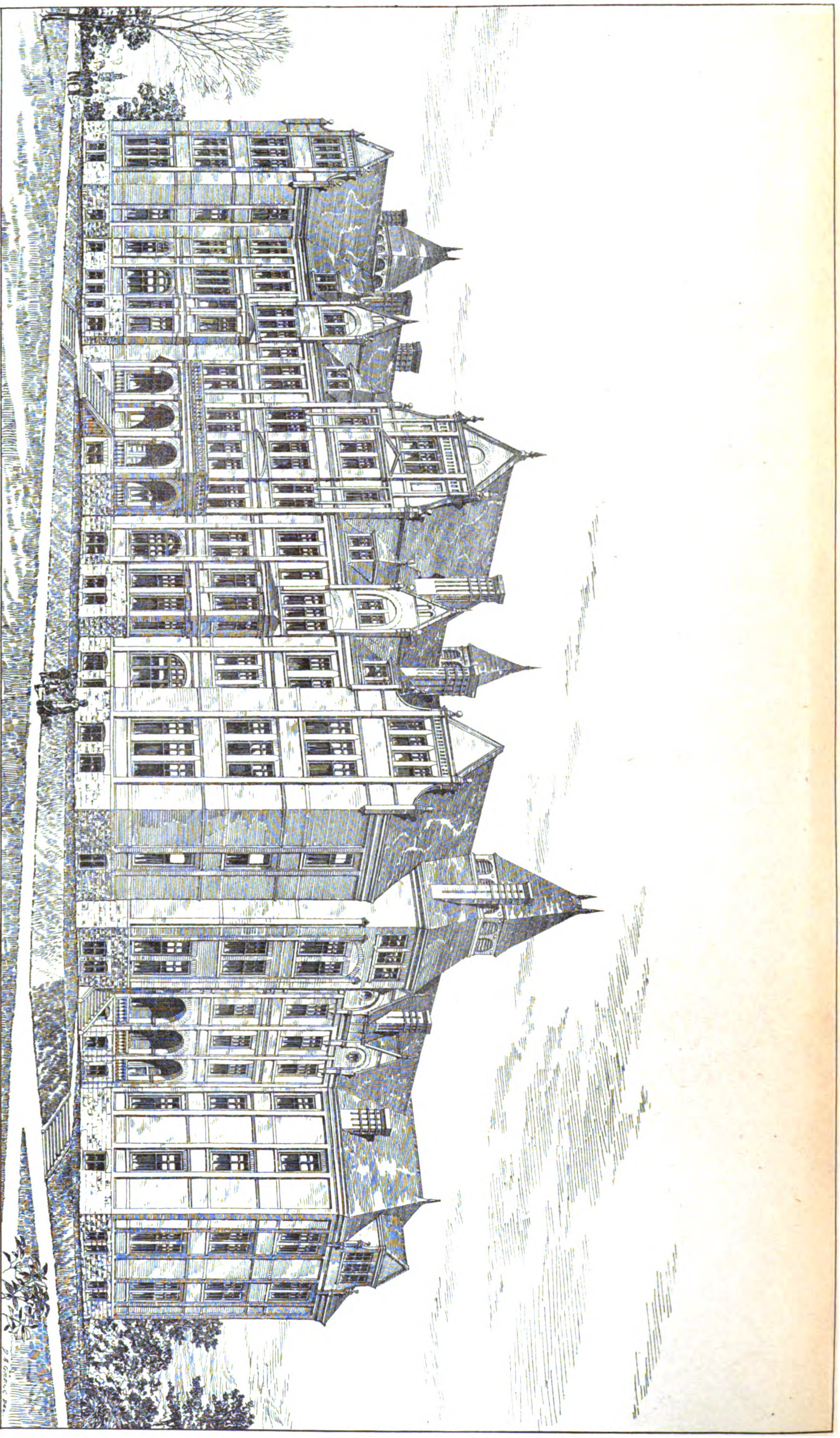


C · A · WALLINGFORD · ARCHT.

INDIANAPOLIS · IND ·

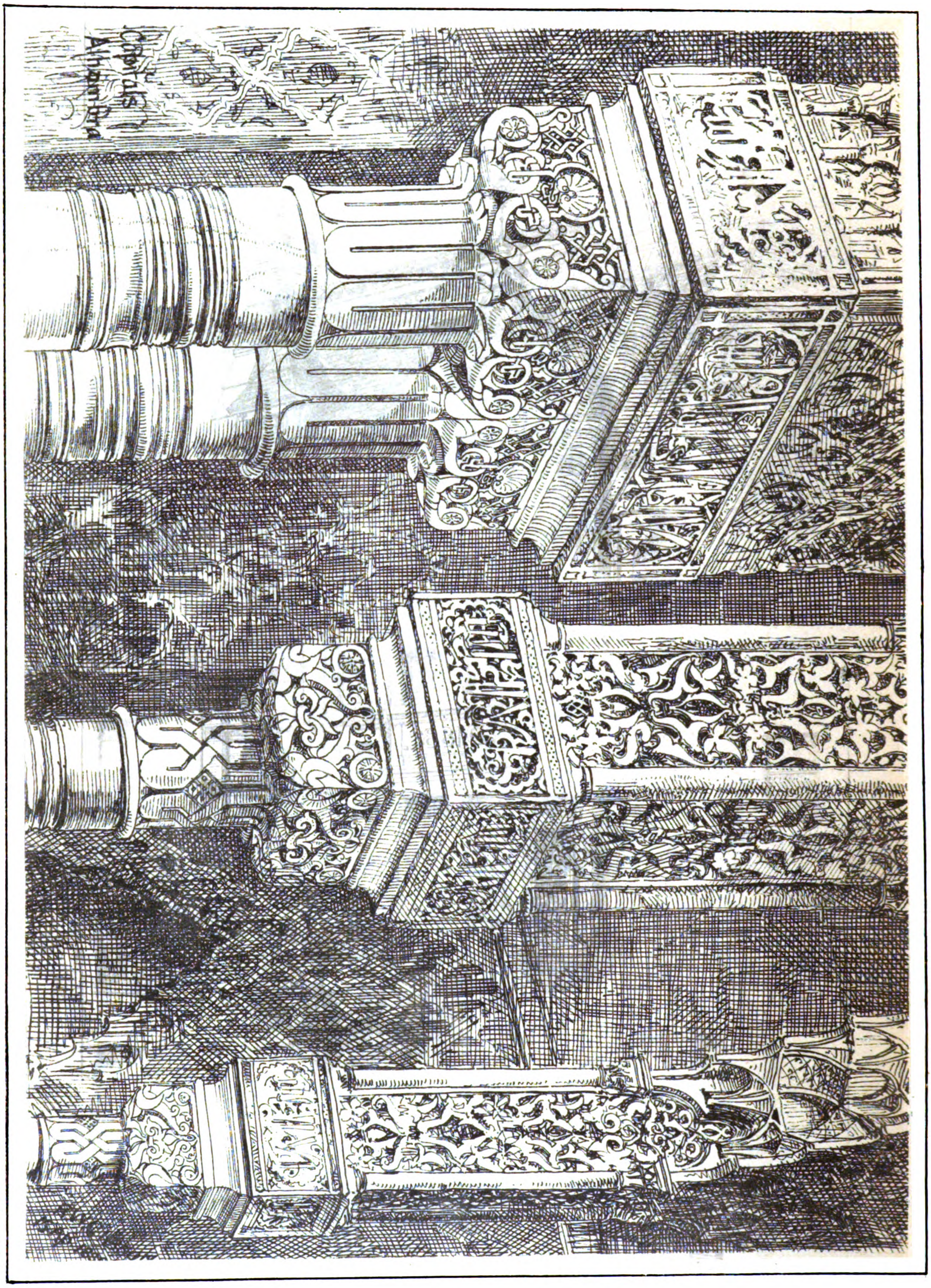
The Heliotype Printing Co 211 Tremont St. Boston.

Dec, 8,



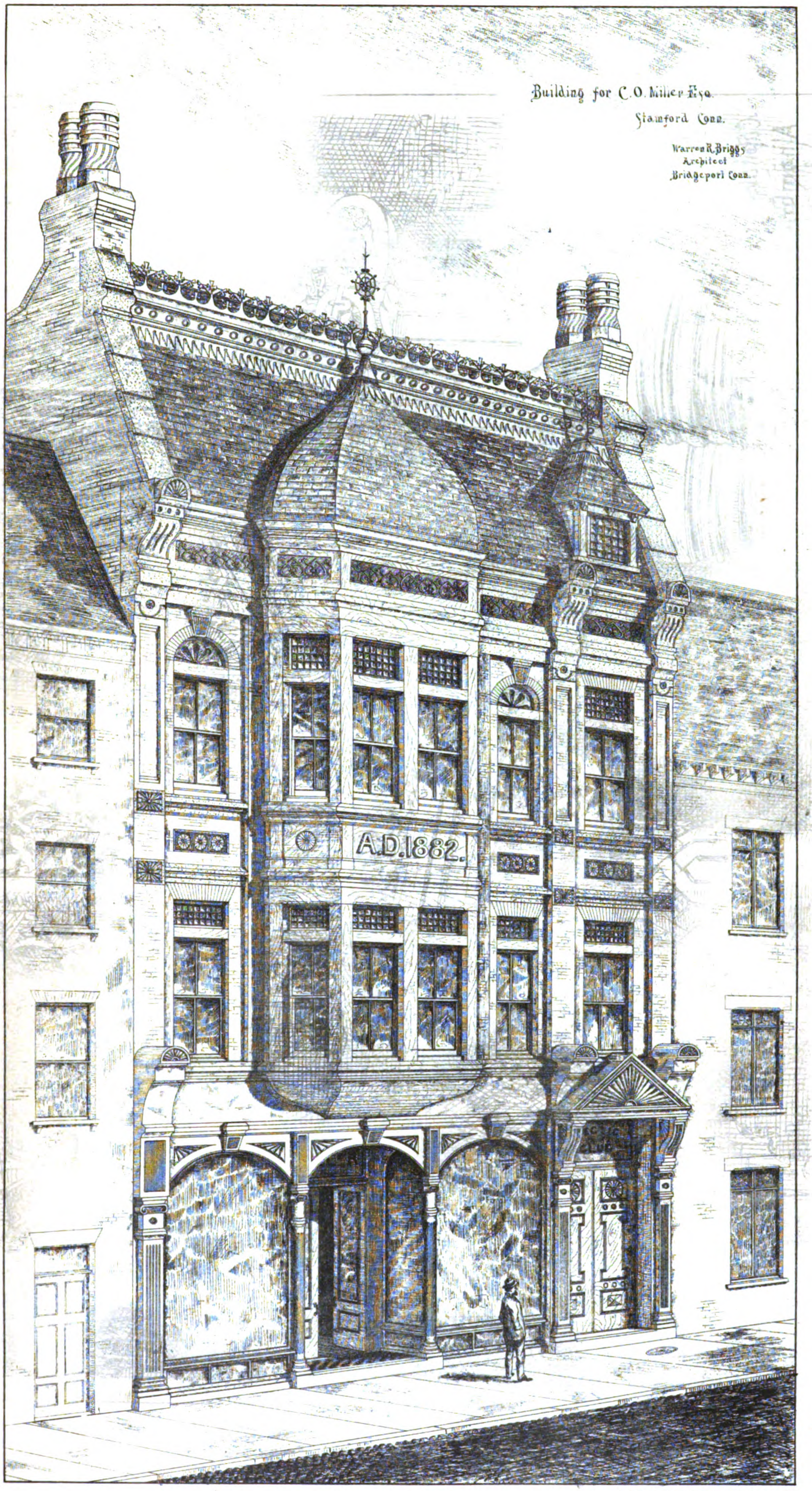
WESTERN PENNSYLVANIA INSTITUTION FOR THE INSTRUCTION OF THE DEAF AND DUMB
JAMES T. STEEN, ARCHITECT. COR. PENN AVE. AND 6TH. ST.
PITTSBURGH. PA.

The Heliotype Printing Co. 211 Tremont St. Boston



The Heliotype Printing Co. 211 Tremont St Boston

AMERICAN ARCHITECT AND BUILDING NEWS, DEC. 8 1883. No. 415



Building for C.O. Miller Esq.
Stamford Conn.

Warren R. Briggs
Architect
Bridgeport Conn.

The Heliotype Printing Co. 211 Tremont St. Boston

AMERICAN ARCHITECT AND BUILDING NEWS. DEC. 8 1883. No. 415

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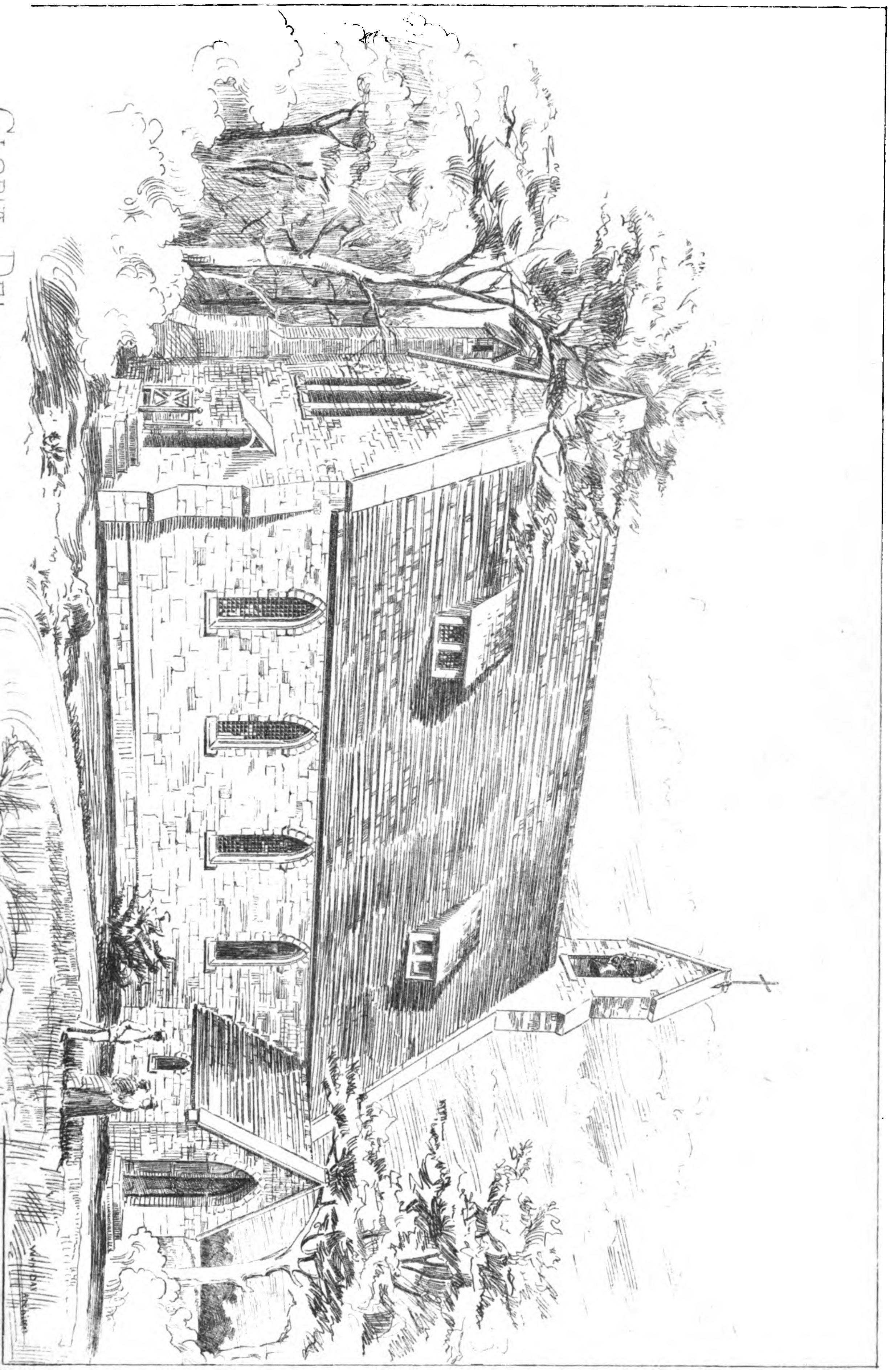


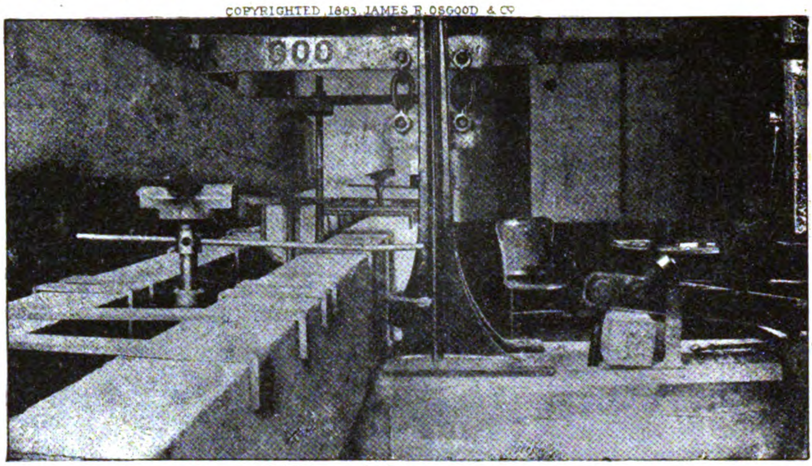
GLORIA DEI CHURCH Palenville · N.Y.

W. S. Clark Del.

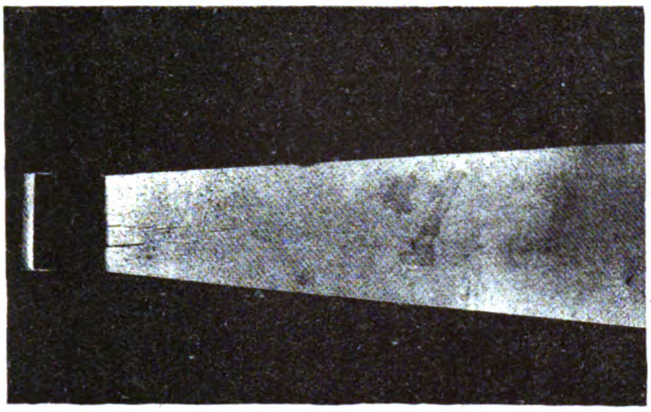
The Heliotype Printing Co. 211 Tremont St. Boston.

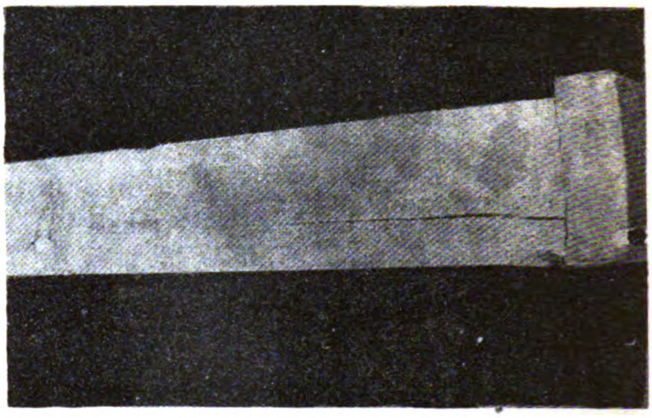
Results of Tests of Transverse Strength of Beams

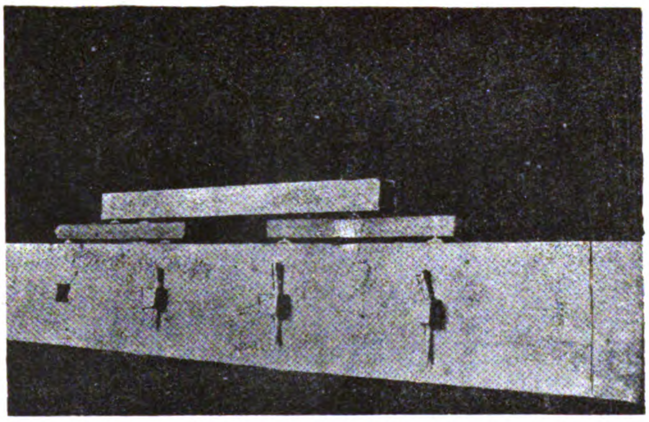
Made at the Mass. Institute of Technology, Boston.

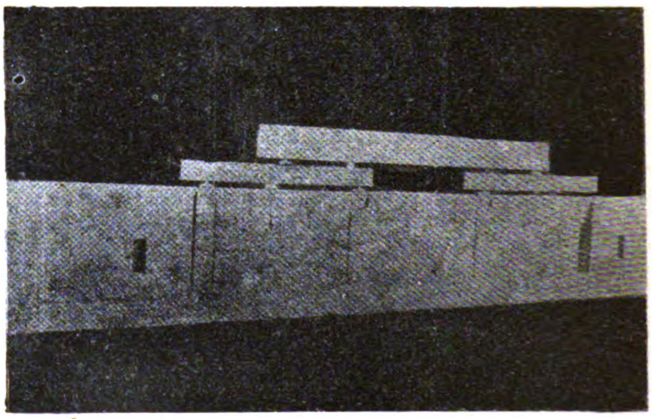


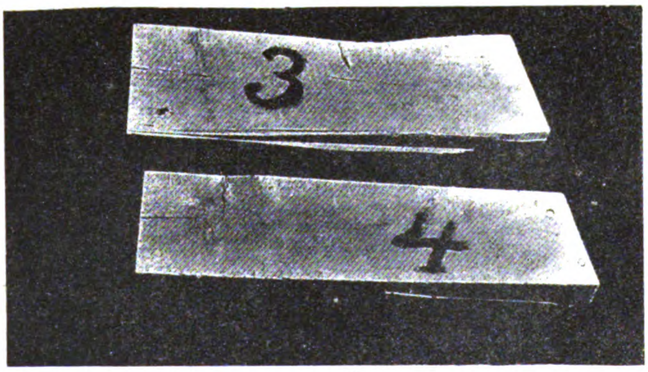
The Machine

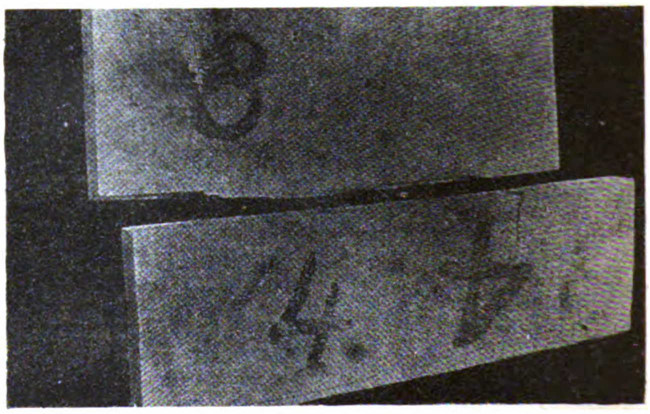


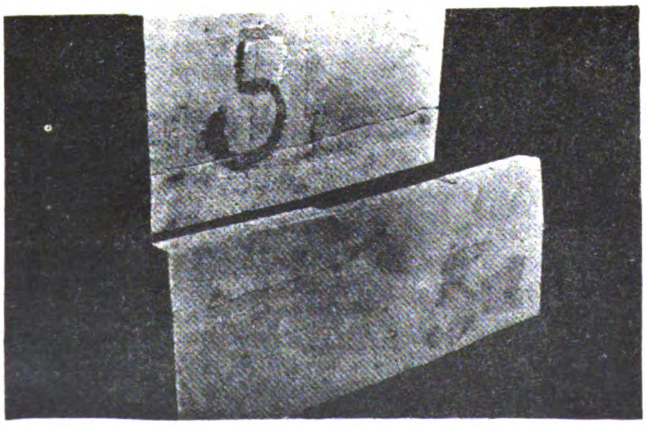




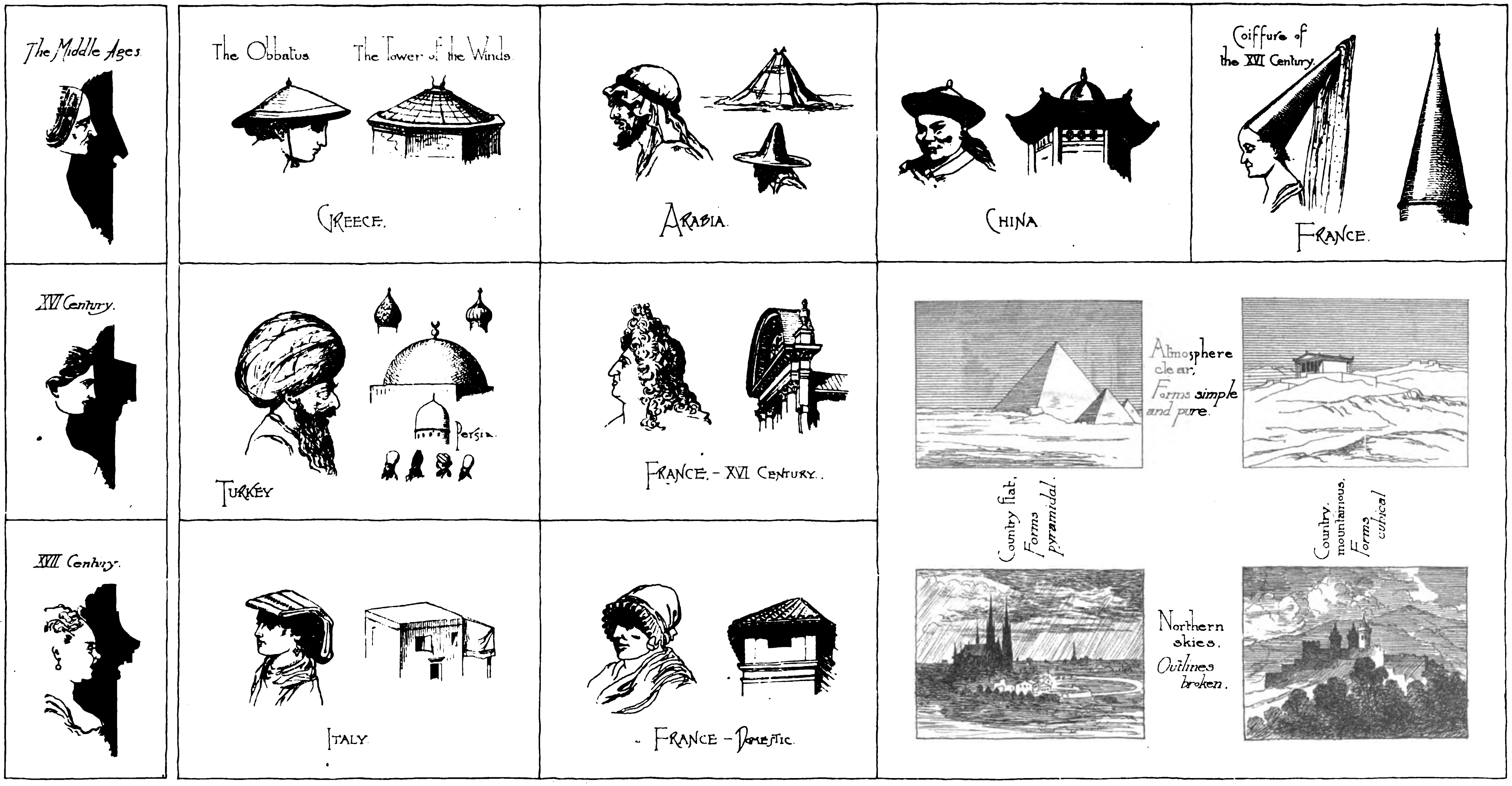








The Heliotype Printing Co. 211 Tremont St. Boston



THE ETHNOLOGY OF ARCHITECTURAL FORMS. (After the *Revue Générale de l'Architecture*) H. ESPÉRANDIEU. Architect.

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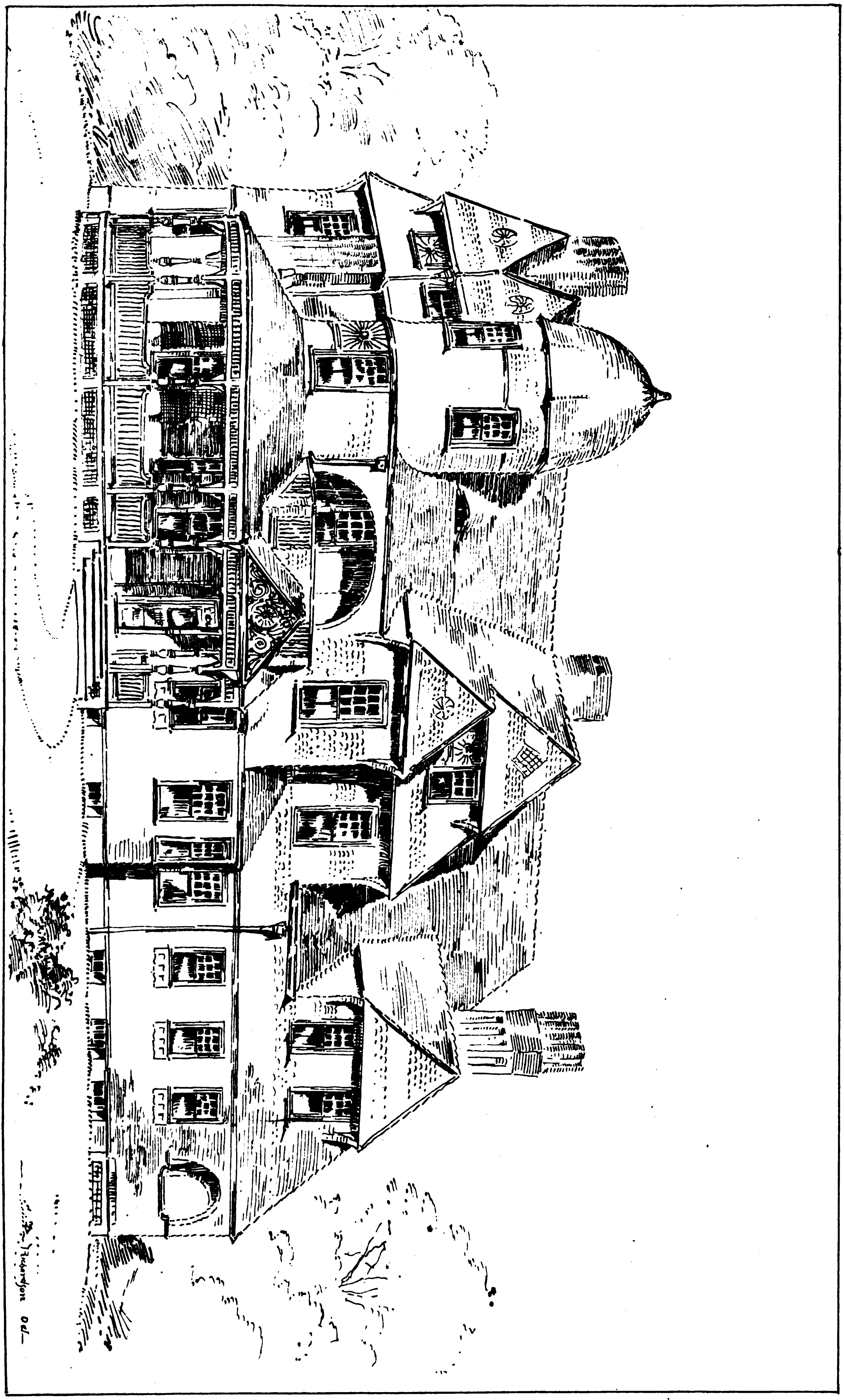
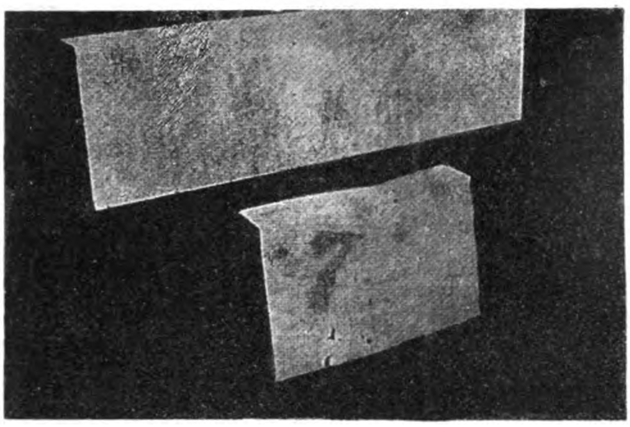
AMERICAN ARCHITECT AND BUILDING NEWS, DEC. 15 1883. NO. 416

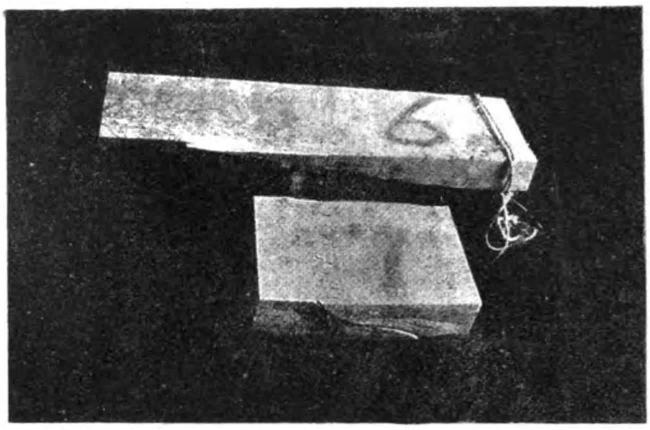


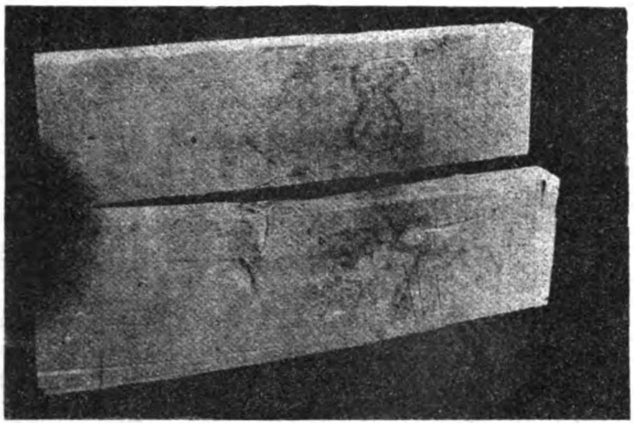
:: HOUSE FOR JOSEPH M JOHNSON :: BINGHAMPTON N.Y.

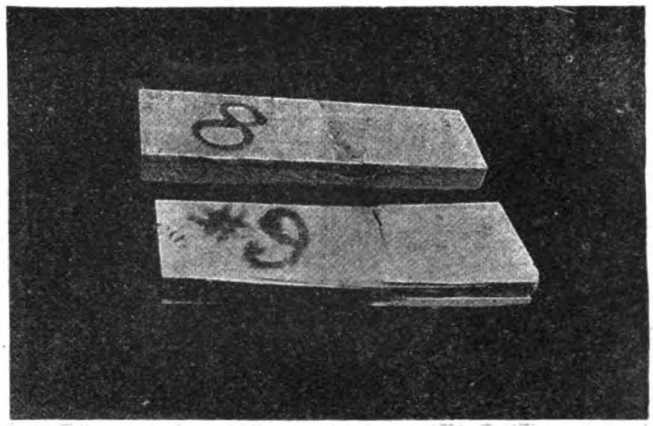
:: Hartwell & Richardson Archts Boston ::

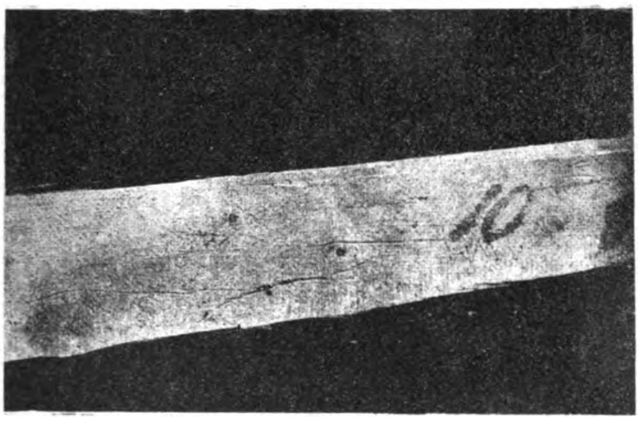
The Heliotype Printing Co. 211 Tremont St. B

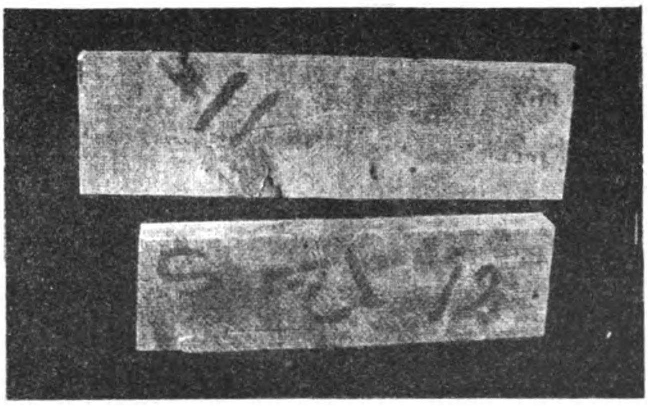


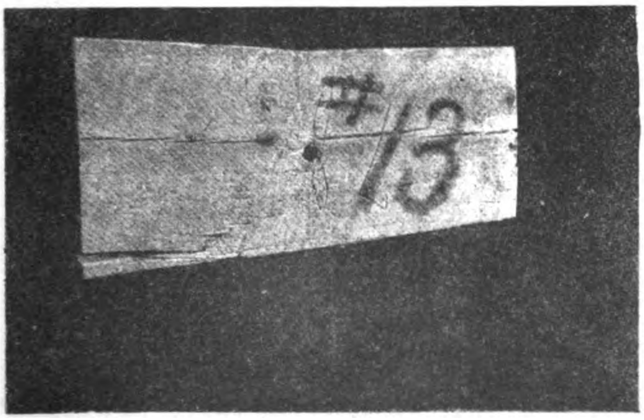


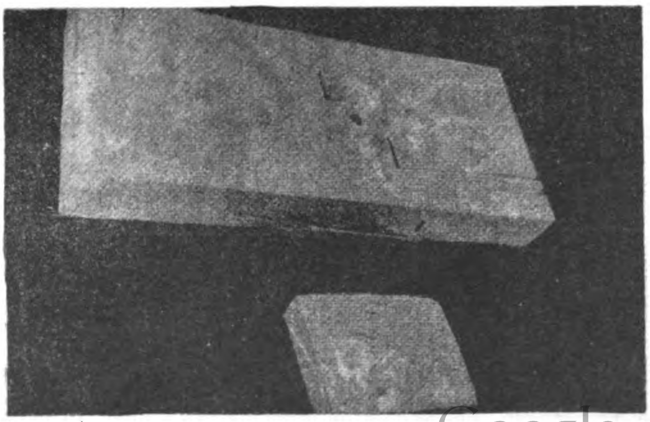




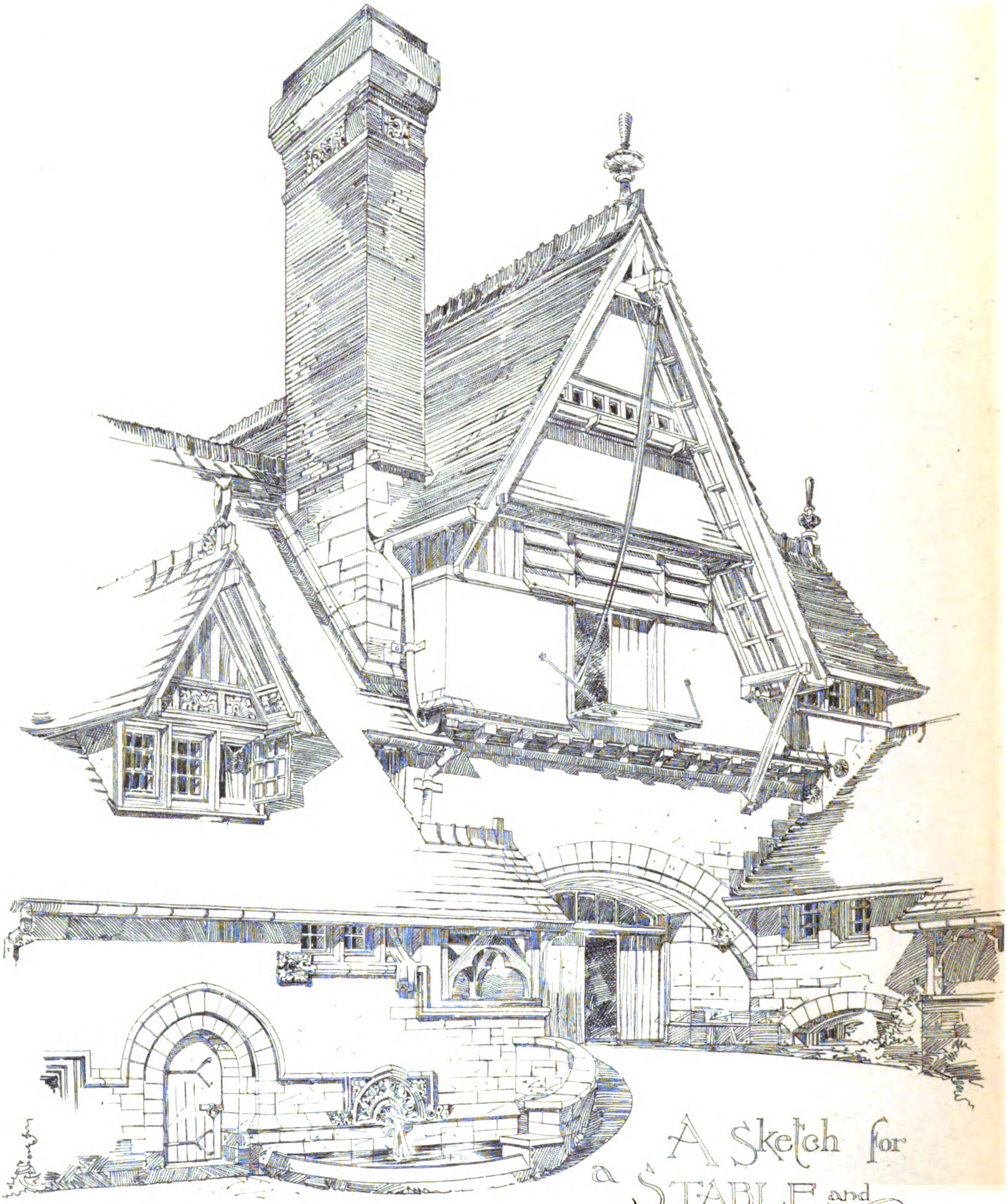








The Heliotype Printing Co. [illegible] Boston

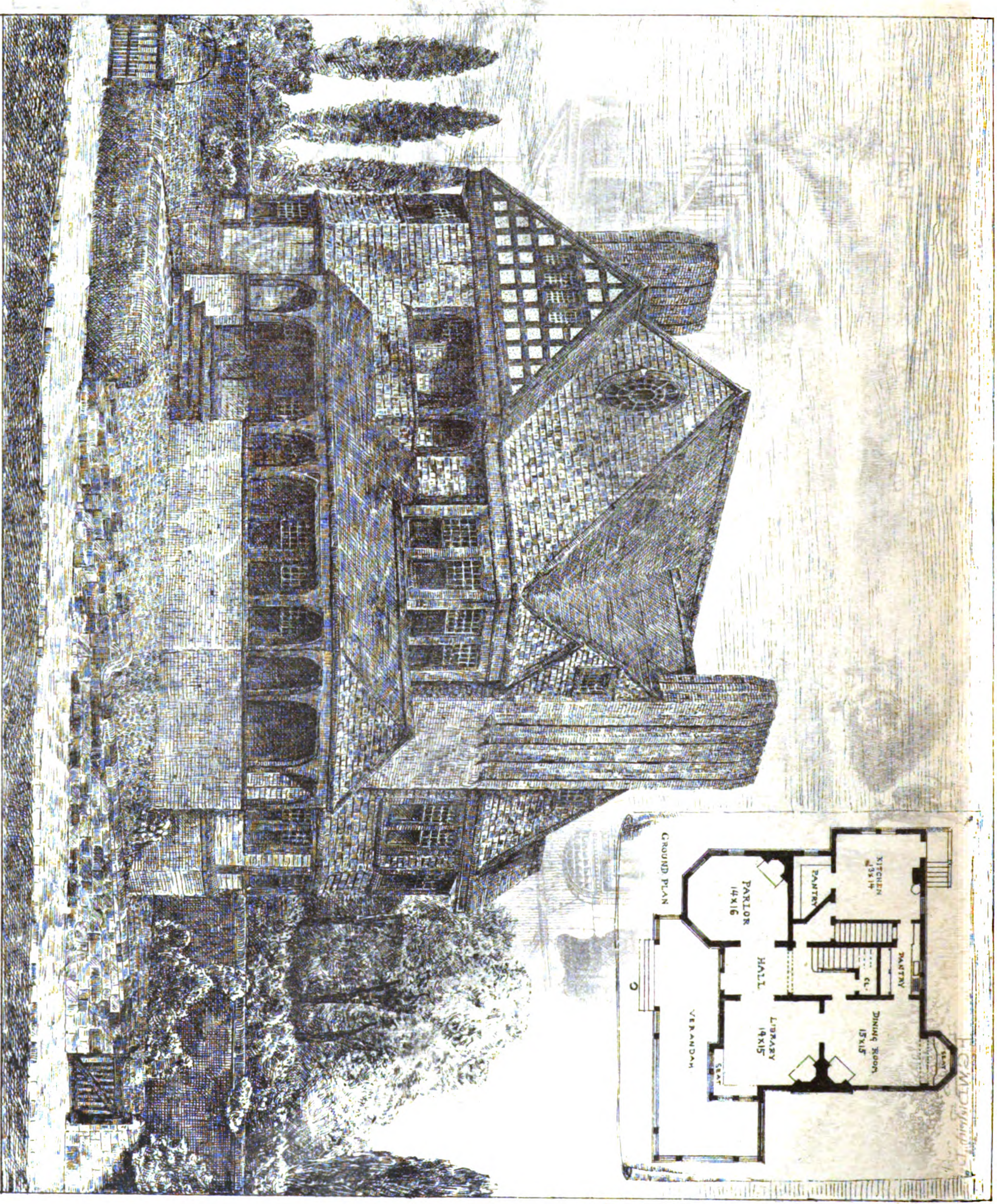


A Sketch for a Stable and Coachmans Rooms

Henry P Kirby Architect and del. Allegheny Pa

The Heliotype Printing Co. 211 Tremont St. Boston

No. 417 American Architect and Building News. Dec. 22 1883.



House at Longwood Mass· for Mr. Geo· H· Wright·

Wm· A· Bates· Archt· 149 B'way· New· York·

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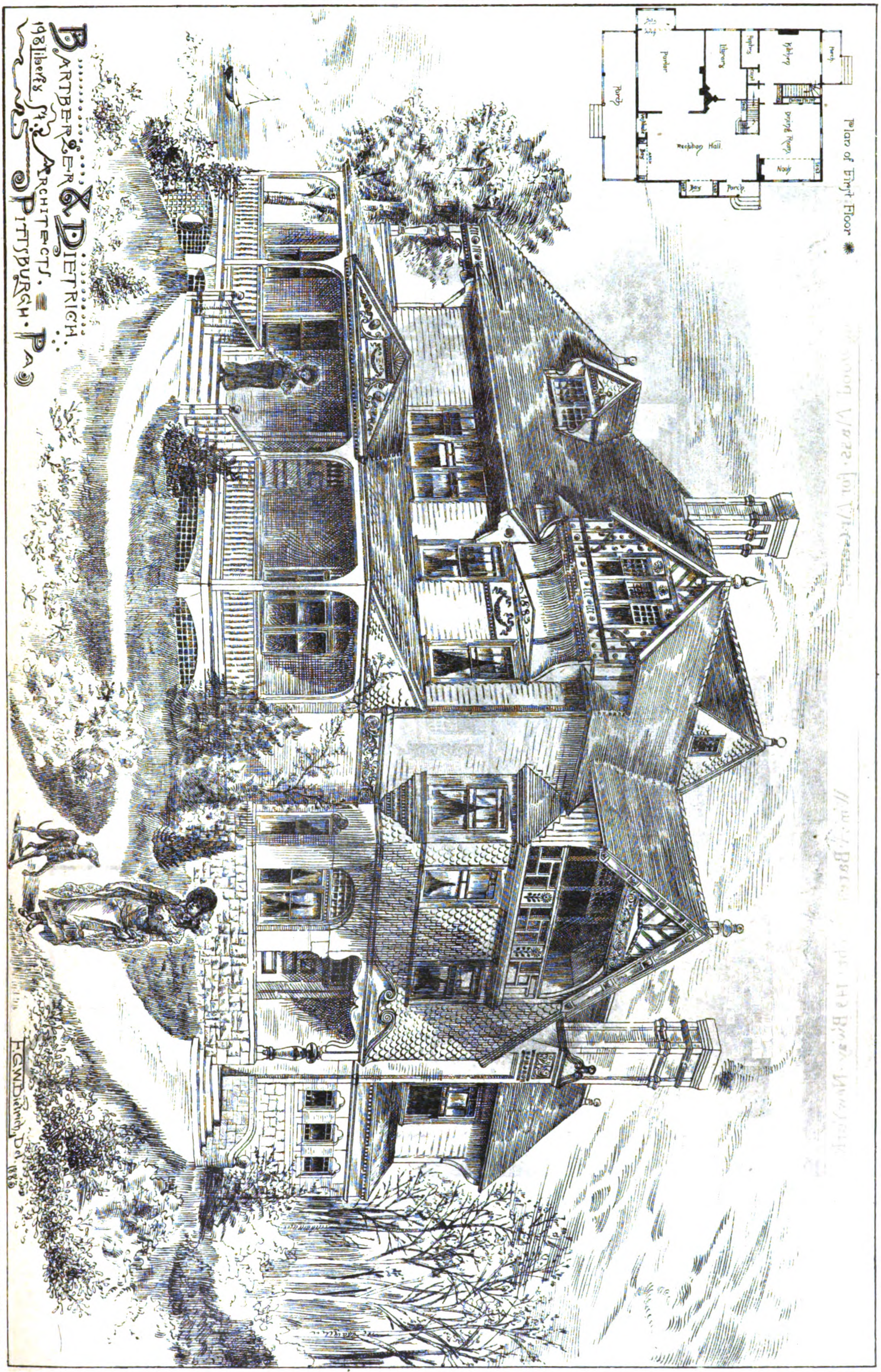
AMERICAN ARCHITECT AND BUILDING NEWS. DEC. 22 1883. No. 417

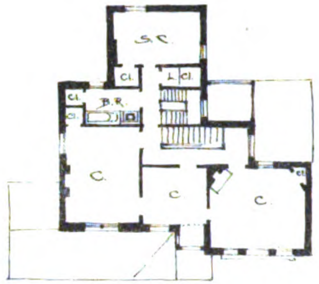


The Heliotype Printing Co. 211 Tremont St. Boston.

View in Hallway.

House for Mr Walter Zinn.
at Delhi, O.
Mr I. Anderson, Archt.
Cincinnati O.

First Floor Plan.



Second Floor Plan.

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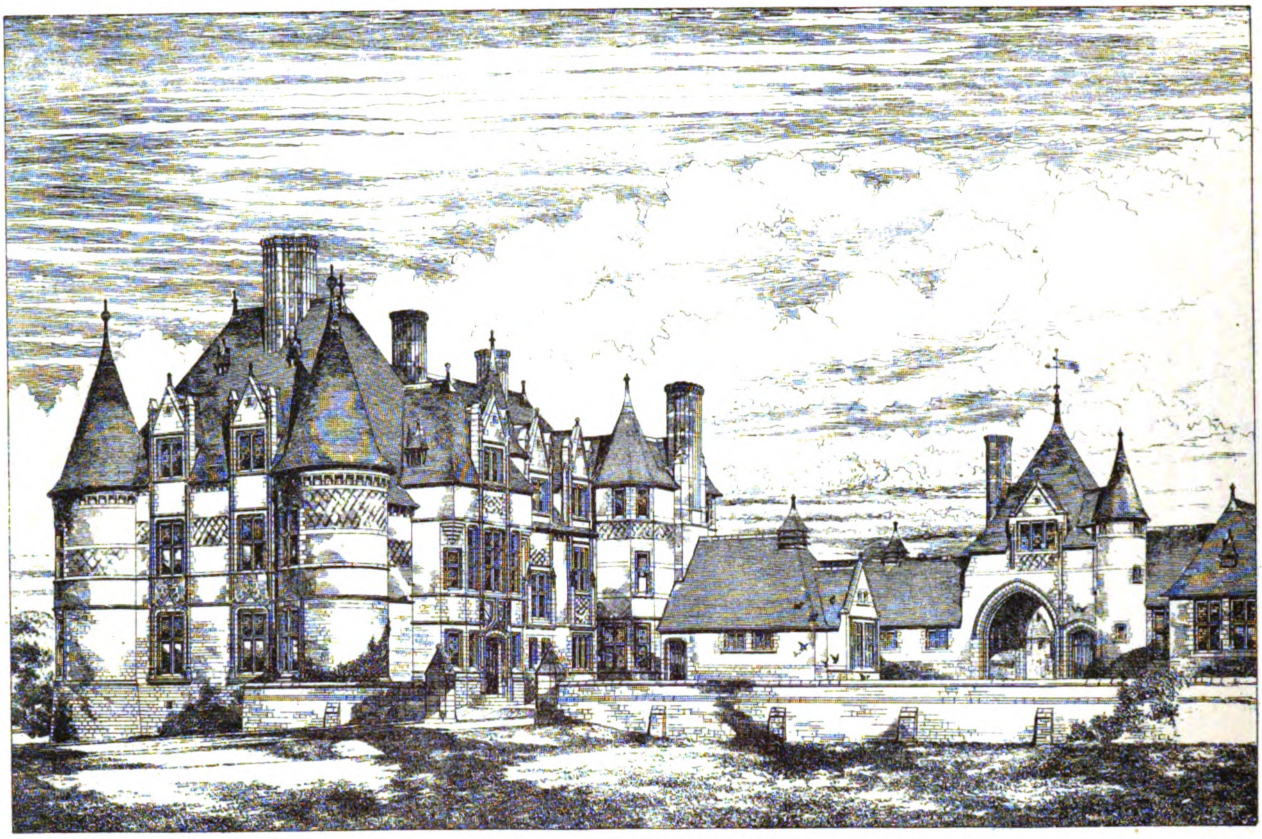
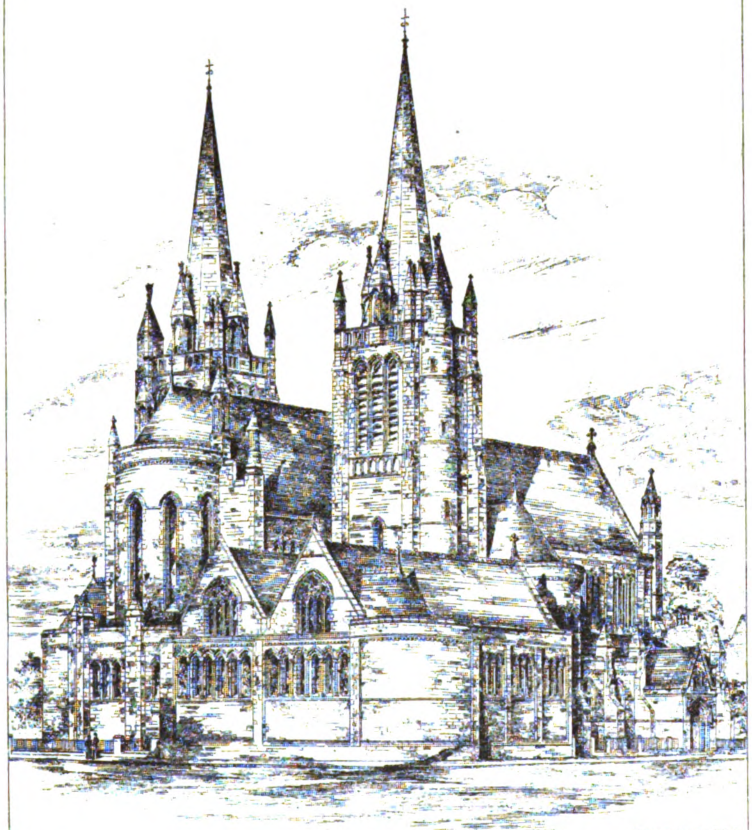


AGENT'S HOUSE AND ESTATES OFFICES ECCLESTON
JOHN DOUGLAS ARCHITECT

THE BUILDING NEWS.

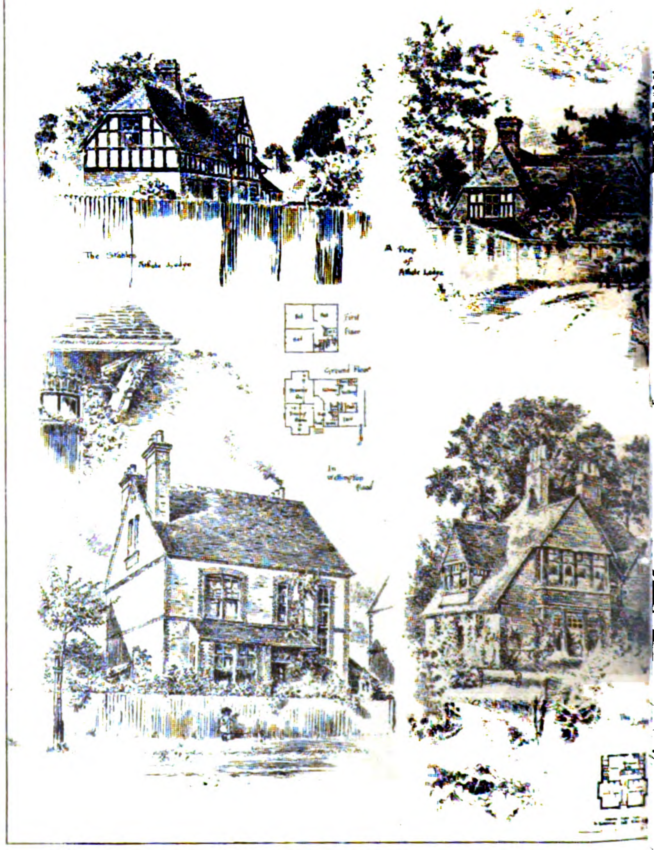
OUR FOREIGN E

Battersea Park Church.
North East View



WILLIAM WHITE, F.S.A.,
ARCHITECT.

THE BUILDING WORLD.



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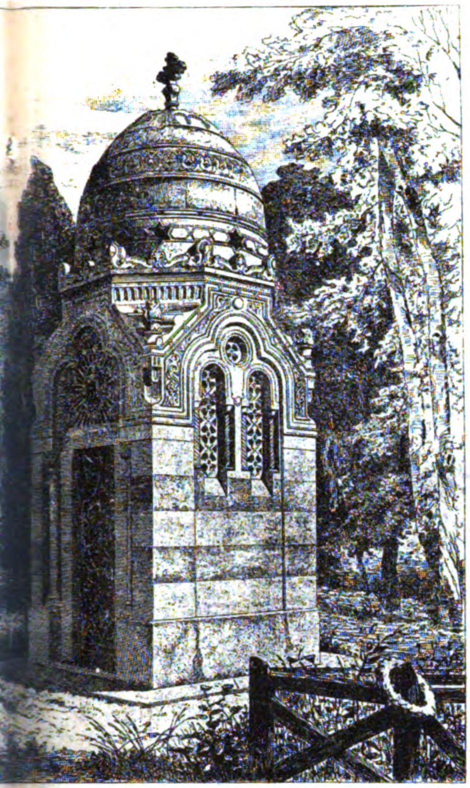


OMBEAU DE LA FAMILLE CHAILAN
CIMETIERE S^T PIERRE
MARSEILLE
A G ALLAR ARCHITECTE

XCHANGES · XX ·

THE BUILDER

THE MAXIMILIAN-STRASSE AT AUGSBURG

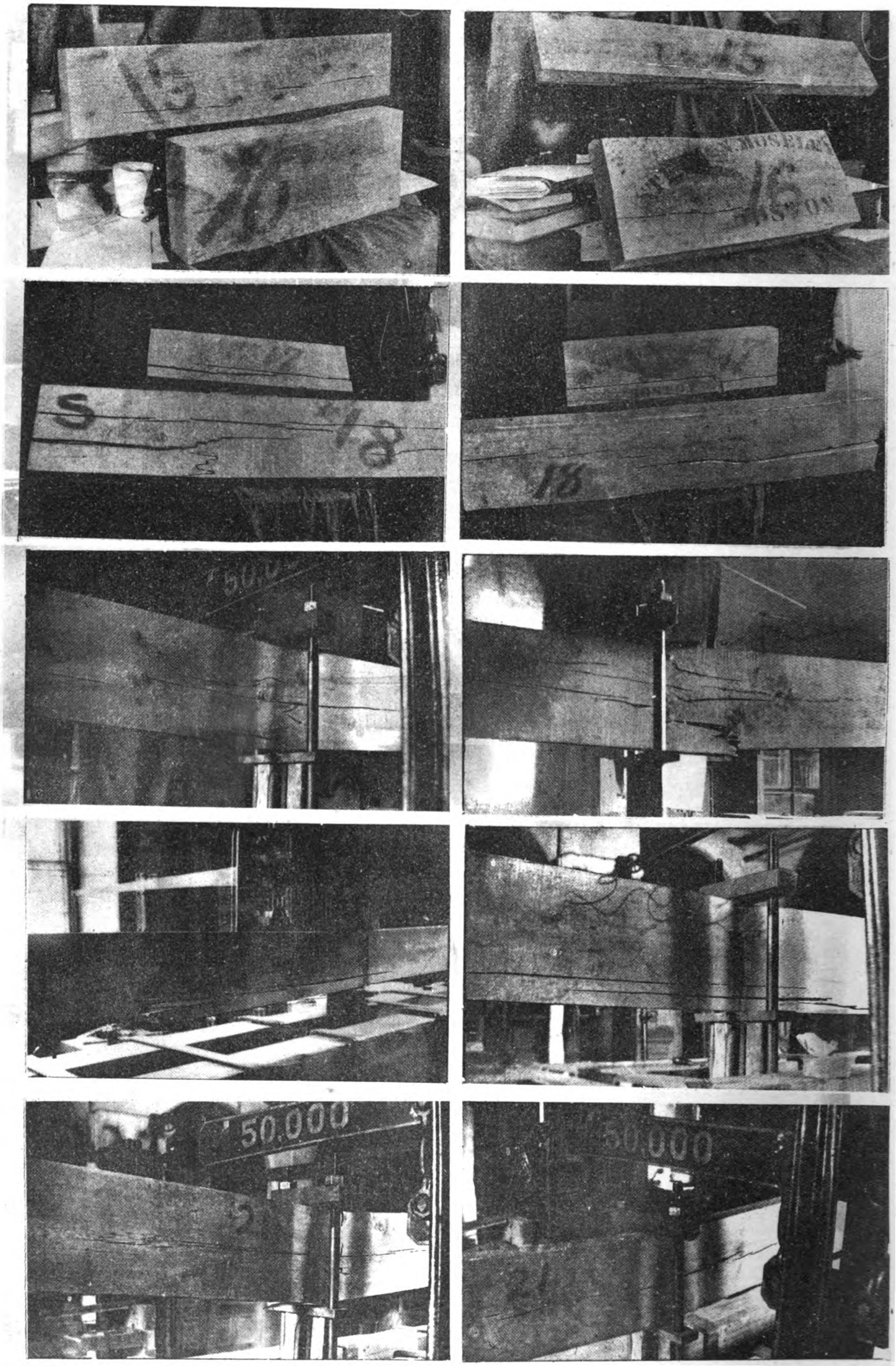
The British Architect.

HOTELS PARTICULIERS RÉCEMMENT CONSTRUITS A PARIS

HOTEL, RUE DE MONTCHANIN, 13. — Architecte : M. Degeorge. — Dessin de M. Noé.

LA SEMAINE DES CONSTRUCTEURS

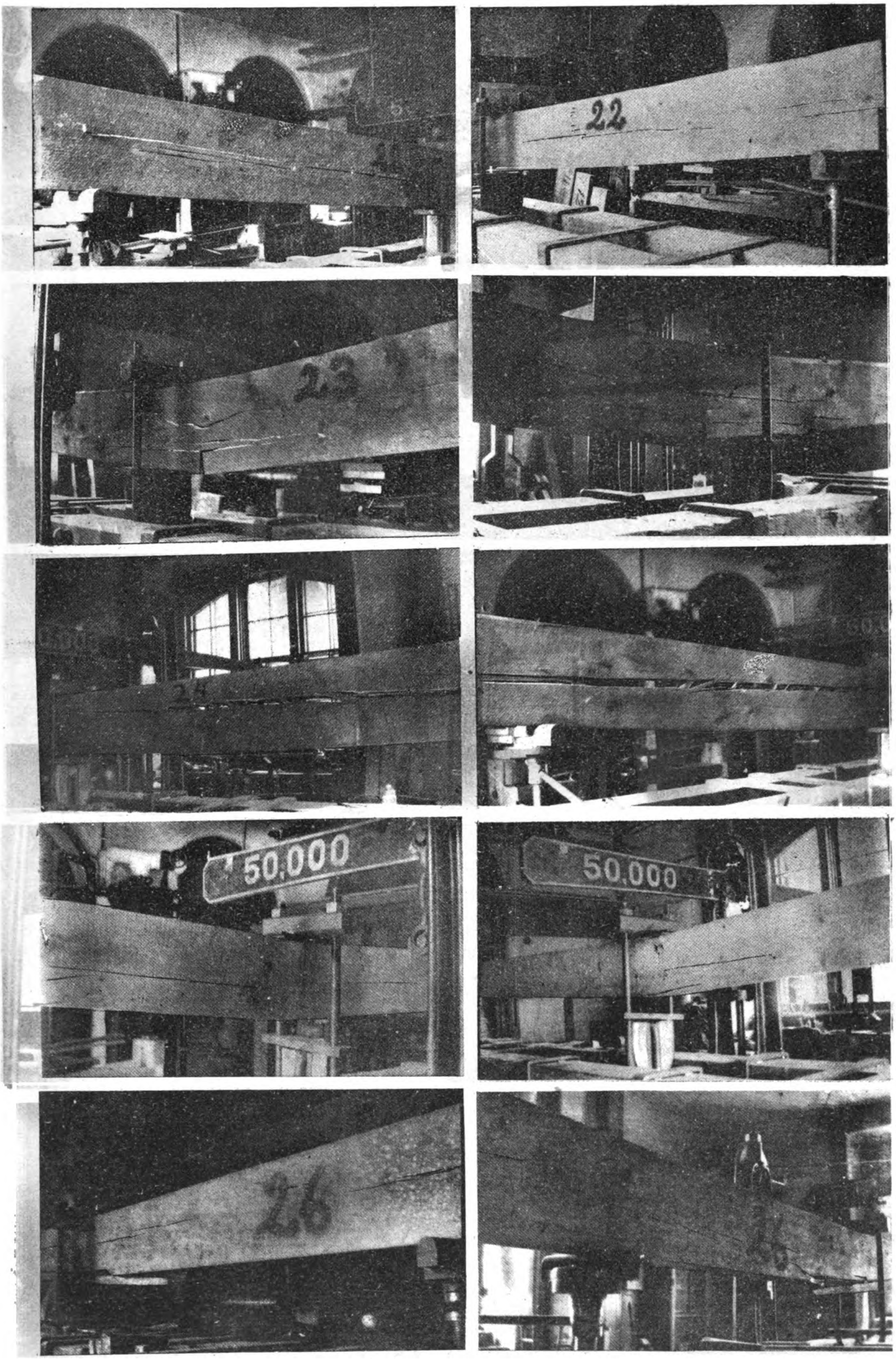
h 21 Tremont St Boston.



Transverse Strength of Beams. Plate 3.

The Heliotype Printing Co. 211 Tremont St. Boston

AMERICAN ARCHITECT AND BUILDING NEWS, DEC. 29 1883. No. 418



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TRANSVERSE STRENGTH OF BEAMS. PLATE 4.